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GENDER DIFFERENTIALS IN INCOME AND RESOURCE UTILIZATION AMONG MAIZE FARMERS IN THE OSOGBO AGRICULTURAL DEVELOPMENT PROGRAMME (ADP) ZONE OF OSUN STATE, NIGERIA

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Abstract

Gender inequality still plagues agricultural production in developing nations. One hundred and twenty (120) maize farmers were selected from the study area using a multi-stage sampling procedure. Both descriptive and inferential statistics, such as a two-sample t-test and ordinary least squares multiple regression, were used to assess the data acquired. The results of the descriptive analysis showed that the average farm size of male and female farmers was determined to be 2.1 ha and 1.7 ha respectively and that 66.7% and 81.8% of male and female farmers, respectively, had formal education. Males had a lower income per hectare (₦53.657) than females did (₦68.181) on average. The t-test's outcome revealed a significant difference between male and female farmers' cumulative average farm income. Age ($p < 0.01$), years of farming experience ($p < 0.05$), farm size ($p < 0.01$), and tractor operation costs ($p < 0.01$) were significant income determinants among female maize farmers, whereas years of formal education ($p < 0.05$), years of farming experience ($p < 0.05$), farm size ($p < 0.01$), and labor cost ($p < 0.05$) were significant income determinants among their male counterparts. The practical value of this study is confirmation that maize farming is a profitable farming enterprise option for both male and female farmers in the study area. Since women are capable of using resources effectively to reach higher levels of farm income than men, the government should launch certain specialized empowerment programs aimed at them.

Keywords: sex, maize, resource, utilization, disparity

INTRODUCTION

The importance of women's contributions to economic growth and the domestic load they carry in domestic and agricultural work over the years has increased interest in gender analysis among many academics and researchers around the world. According to empirical studies conducted in sub-Saharan Africa, the women farmers produce less than men do (Larson et al., 2015). Studies (Cadzow, 2016; Doss, 2015) have shown that women have less access to land than men do and that when they do, the tenure security may be problematic. Additionally, compared to males, their access to agricultural information and extension services is frequently more constrained (Bravo-Monroy et al., 2016). When cultivating crops, women are more likely to have an access restriction, which causes them to use less fertilizer, labor, and other inputs than is ideal (Cadzow, 2015). Between 1990 and 2015, Nigeria produced an estimated up to 4.7 million tonnes of maize on average, with a rise

in maize's share of overall grain production from 8.7% in 1980 to around 22% in 2003. Nigeria consumed 10.9 million metric tonnes of maize in 2017, according to the Mundi Index.

The degree of agricultural productivity disparities between male and female farmers varies among and within nations in sub-Saharan Africa. According to empirical data, there are often between 20 and 30 percent gender inequalities in agricultural output across sub-Saharan African nations, with an average of 25 percent (Aguilar et al., 2014; Mukasa & Salami 2015). Overcoming gender-specific variations in input usage regarding agricultural productivity in subsistence farming has been of special importance from the perspective of public policy in developing nations. The international development community has responded to the current resurgence of interest in and awareness of gender inequality in agriculture with many fresh initiatives, calls for action, and offers (World Bank 2007, 2009; Quisumbing & Pandolfelli, 2010). In general, there is a disagreement over the precise scope and implications of gender disparities in access to advanced agricultural technologies. The agricultural climate in Nigeria has been marked by gender disparity, which is still an issue.

A significant issue is the extent to which gender stratification affects the distribution of production resources, information, and even access to appropriate technology. The productivity of female producers is decreased by gender disparities in access to productive assets more than the productivity of male producers. Women still play a significant role in agriculture, although very few of them own or have control over productive resources. Men now play a prominent role in agricultural production due to women's limited access to production inputs. This is primarily the case in agriculture in poor countries, where the farming system is largely patriarchal. Both men and women contribute their labor, but men play dominant roles since they have more access to farm resources (Okoruwa et al., 2009). In light of this, the study aimed to evaluate the gender differentials in income and resource utilization among maize farmers in the Osogbo Agricultural Development Projects (ADP) zone of Osun State, Nigeria. The specific objectives were to describe the socio-economic characteristics of male and female maize farmers, to examine significant difference in the resource utilization by male and female maize farmers, to determine significant difference in farm income of male and female farmers, and to analyze the determinants of farm income according to the gender.

Hypotheses of the study

i. There is no significant difference in farm inputs used by male and female maize farmers.

ii. There is no significant difference in the average farm income of male and female maize farmers.

MATERIALS AND METHODS

Description of the study area

The Osogbo Agricultural Development Projects (ADP) zone, Osun state of Nigeria is where the study was conducted. With a land area of about 9,251 square kilometers and an undulating topography, Osogbo is situated between latitudes 7.0^0 North and 9.0^0 North of the equator and longitudes 2.8^0 East and 6.8^0 East of the meridian. Its capital is located in Oshogbo, it is bounded in the East and West respectively by Ondo and Oyo States, while Kwara and Ogun States are its boundaries in the North and South respectively.

Source and type of data

This study made use of primary data. A well-structured questionnaire and an unstructured interview were used to collect the primary data. The questionnaires were designed to collect information on socioeconomic factors, the use of inputs, and farm income.

Sampling techniques and data collection

Based on the information provided by the ADP zonal office in the study area, the first stage was the purposive selection of three blocks where there is massive maize production in the ADP zone. From each of the blocks chosen in the first stage, forty (40) maize growers were randomly selected in the second stage. The All Farmers Association of Nigeria (AFAN) registered farmers who are present in each sampled block make up the sampling frame. One hundred and twenty (120) maize farmers were included in the final process sample, and one hundred and nineteen (119) farmers were employed for the analysis due to incomplete information in one of the questionnaires. The sampled blocks include Irepodun, Olorunda, and Ede South

Analytical techniques and models

The study employed analytical tools based on the stated objectives. They comprise inferential statistics as well as descriptive statistics. The used descriptive statistics tools were mean, standard deviation, frequency counts, and percentages which were applied to describe the socio-economic characteristics of the maize farmers. The stated hypothesis was tested using a two-sample t-test as an inferential statistical tool, and ordinary least squares multiple regression models were employed to evaluate factors affecting farm income by gender.

Ordinary least squares multiple regression models

The average farm income by gender and their determinants were fitted into four functional forms. These models were explicitly specified as follows:

Linear function:

$$Y = f(b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5 x_5 + b_6x_6 + b_7 x_7 + e) \quad (1)$$

Exponential function:

$$LnY = f(b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5 x_5 + b_6x_6 + b_7 x_7 + e) \quad (2)$$

Semi – log function:

$$Y = f(b_0 + b_1\ln x_1 + b_2\ln x_2 + b_3\ln x_3 + b_4\ln x_4 + b_5\ln x_5 + b_6\ln x_6 + b_7\ln x_7 + e) \quad (3)$$

Double-log function:

$$LnY = f(b_0 + b_1\ln x_1 + b_2\ln x_2 + b_3\ln x_3 + b_4\ln x_4 + b_5\ln x_5 + b_6\ln x_6 + b_7\ln x_7 + e) \quad (4)$$

Where

Y = Average farm income by gender in naira value.

x_1= Age of the maize farmers in years

x_2 = Years of formal education attainment (number of years spent in formal education)

x_3 = Farming experience in years

x_4 = Farm size in Hectares

x_5 = Amount spent on agrochemicals in naira

x_6 = Amount spent on tractor operations in naira

x_7= Labour used in man-days

b_1 – b_7 are the co-efficient parameters to be estimated

e = stochastic error variable

RESULTS AND DISCUSSION

Socioeconomic characteristics of the maize farmers

Results in Table 1 presented the socioeconomic characteristics of maize farmers. Results in Table 1 showed that the majority (72.8%) of female maize farmers were under the same age group as male farmers, whereas almost two-thirds (64.8%) of the male farmers were under 45. This result shows that the proportion of female maize farmers below the age of 45 years was more than that of males implying that a larger proportion of female maize farmer were below the age of 50 years which might positively influence their productivity. Age is particularly essential in

agricultural production activities since it has a substantial impact on the decision-making process, according to research done by Akudugu et al. (2012).

The results presented in Table 1 reveal that the majority of women (81.8%) and two-thirds (66.7%) of the male maize farmers both had educations beyond the primary level. The percentage of farmers with tertiary education was, however, higher among men (36.1%) than among women (9.1%), which was significantly low. This finding raises the possibility that male maize farmers may have easier access to formal education, highlighting the stark difference between the educational levels of male and female maize farmers in the research area. This finding is consistent with observations made by Bawa et al. (2010) and Qiang et al. (2011) that educated farmers can learn information from a variety of sources, such as extension agents, electronic print media, and the internet. These inputs are essential for maintaining agricultural productivity, profitability, and sustainability.

Years of farming experience (Table 1) reveals that male farmers had an average of 18.3 years in maize farming, compared to their female counterparts' 10.4 years on average. This finding, as it is currently interpreted, indicates that men have more experience growing maize than women. Male farmers are predicted to have an edge over female farmers in terms of productivity due to their greater number of years of expertise growing maize. It is impossible to overstate the value of farming expertise in agricultural productivity since it affects farmers' capacity to make wise decisions regarding their farms. Due to the development of skills, experience is predicted to have an impact on agricultural production efficiencies. Tien (2007) noted that the longer a person stays on a particular job, the better his job performance tends to be.

Results presented in Table 1 show that the mean farm size of the male maize farmers was 2.1±0.7 hectares while the mean farm size of females was 1.7±0.3 hectares. It showed that the male farmers had greater access to farm plot acreage than female farmers, which may be a result of the traditional hereditary land tenure structure that privileges men over women in southwest Nigeria. Additionally, this result demonstrates that the small-scale farming is a subsistence farming system. According to Baba et al. (2015), the land access restrictions continue to be a key obstacle for women farmers in Africa, and the land reform initiatives have largely resulted in the transfer of land rights to male household heads.

The result on credit accessibility (Table 1) shows that few (36.4%) of the male farmers had access to credit while two-thirds (67.6%) of the female farmers had access to credit. If the money is used wisely, it suggests that a sizable part of the female maize farmers had the chance to obtain cash to raise their level of production and productivity. This finding conflicts with related research on gender studies done by George et al. (2015), who reported that farmers, particularly women farmers, have limited access to financing.

Table 1. Socioeconomic characteristics of the maize farmers

Characteristics	**Male**		**Female**	
	(%)	**S.D**	**(%)**	**S.D**
Age				
≤ 30years	4.6		9.1	
30-45 years	60.2		63.6	
Above 45 years	35.2		27.3	
Level of education				
None	8.3		9.1	
Primary	25.0		9.1	
Secondary	30.6		72.7	
Tertiary	36.1		9.1	
Farming experience (Years)	18.3	6.1	10.4	4.2
Farm Size (Hectares)	2.1	0.7	1.7	0.3
Access to credit				
No	63.6		32.4	
Yes	36.4		67.6	

Source: Field Survey Data, 2022.

Gender differential in values of average farm income and inputs used

The results in Table 2 are presented using the average yearly agricultural revenue per hectare. According to the findings, the male maize farmers applied fertilizer at a mean cost per hectare of ₦140,300±15,400, whereas the female farmers applied fertilizer at a mean cost per hectare of ₦150,410±16,450. According to Table 2's findings, the male maize farmers spent an average of ₦70,200±7,310 on hired labor per hectare, while the female farmers spent an average of ₦90,450±8,480.

Results, as presented in Table 2 show that the average spending on agrochemicals applied per hectare for male maize farmers was ₦40,600±3,450, and for females was ₦30,700±4,500. The results further reveal that the mean amount of ₦50,200±6,010 was expended on tractor operations per hectare by male maize farmers while it was ₦60,500±7,450 by females. These results on inputs utilization reveal that the mean costs per hectare for females were higher than that of males in fertilizer, labor, and tractor operations while male farmers spent more than females only for agrochemicals. This finding of the study confirms the assertion of Dogbe et al. (2013) that women in their agricultural practices were found to incur more costs for inputs.

The results (Table 2) indicated that the male maize farmers earned an average income per hectare of ₦53,657.14±4,125, while the female farmers earned an average income per hectare of N68,181.82±5,020, suggesting that the female farmers earned a higher farm income per hectare than the male farmers, despite earlier results showing that the female farmers spent more on inputs than male farmers. To maximize farm inputs and increase farm income, it can therefore be said that the female farmers perform better than the male farmers.

Table 2. Differential values of average farm income and inputs used by male and female maize farmers

Average Income / Inputs used (₦)/Ha	Male (%)	S.D	Female (%)	S.D
Fertilizer	140,300	15,400	150, 410	16,450
Labor	70,200	7,310	90,450	8,450
Agrochemicals	40,600	3,450	30, 700	4,500
Tractor	50,200	6,010	60, 500	8450
Average Farm Income	53,657.14	4,125	68,181.82	5,020

Source: Field Survey Data, 2022.

Gender differential in inputs utilization and farm income by the maize farmers

The results (Table 3) show the independent t-test conducted to analyze the differential inputs utilization and accrued average farm income by the male and female maize farmers in the study area. The outcome indicates that there was no statistically significant difference between the male and female farmers' use of inputs in the production of maize (t=1.4). It suggests that the results' finding that the male and female maize farmers employ different levels of inputs at different costs is not statistically significant.

The male and female maize farmers earned considerably different amounts from their farms on average (t=2.9). Therefore, the null hypothesis which stated there is no significant difference in the average farm income of male and female farmers is rejected and the inference is drawn that there is a significant difference in the accrued average farm income between the male and female farmers. Results on farm income earned per hectare showed that the female farmers used

resources more effectively than the male farmers, resulting in higher farm income. This conclusion is consistent with those of a comparable study by Mishra et al. (2017), who found that women attain substantially greater output per hectare values than men.

Table 3. Estimates of t-test statistics for gender differential in inputs and farm income

	Sex	Mean	Std. Error	Std. Dev.	t	Sig.	df.
Inputs	Male	301,300.17	0.3146387	2.25612	1.4	0.12	117
	Female	332,060.13	0.3402307	3.464107			
Income	Male	53,657.14	0.3686184	2.154156	2.9	0.002	117
	Female	68,181.82	0.4402206	3.564607			

Source: Field survey Data, 2022.

*Significant at the 5% level (critical t = 1.96)

Table 4. Multiple regression analysis showing determinants of farm income of female farmers in the study area

Variables	**Coefficient**	**Std. Error**	**t - value**	**p-value**
(Constant)	89.8	18.6	4.83	0. 000***
Age (X_1)	-4.887	1.67	-2.93	0.003***
Years of Formal Education (X_2)	1.653	4.47	0.37	0.189
Years of farming experience (X_3)	1.290	0.54	2.40	0.043**
Farm size (X_4)	8.020	2.98	2.69	0.007***
Cost of Agrochemicals (X_5)	-1.160	1.26	-0.92	0.134
Cost of tractor operations (X_6)	- 1.295	0.49	-2.64	0.001***
Cost of labor (X_7)	-2.086	1.71	-1.22	0.185
F Statistics = 18.21				0.000
R^2 = 0.6597				
Adj R-squared = 0.6315				

Source: Field Survey Data, 2022.

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Determinants of farm income of female maize farmers in the study area

Table 4 presents the multiple linear regressions of the factors affecting the income of female maize farmers. The results in Table 4 show that the semi-log equation was chosen as the lead equation based on an econometric and statistical criterion. The coefficient of multiple determination (R^2) shows that 66.0 % of the variation in farm income has been determined by the included independent variables in the model. The coefficient of R^2 and F statistics which was significant at $p < 0.01$ shows that the exponential model was well-fitted.

According to the findings presented in Table 4, the average farm income of the female farmers in the research area was influenced by their age, years of farming experience, farm size, and tractor operation costs. Except for the age of the female farmers and the cost of tractor operations, all of these factors were positively correlated with the average farm income. The age correlation coefficient was 4.887 and was statistically significant at 1% level of significance, indicating that an increase in age will result in a 4.9-unit decline in the average farm income of female farmers. This outcome supports the idea that productivity declines with age. At 5% level of significance, the years of farming experience variable exhibited a positive coefficient of 1.290 and were statistically significant. Based on this finding, the farm revenue will rise by 1.2 units for every additional year of farming expertise.

The findings, which are shown in Table 4, indicate that the farm size variable's coefficient was 8.02 and statistically significant at the 1% level, indicating that an increase in farm size will result in an 8-unit increase in farm revenue. The cost of tractor operations variable exhibited a positive correlation of 1.295 and was statistically significant at 1% level, indicating that a 10% increase in tractor operation costs will result in 1.3 unit drop in farm income.

Determinants of farm income of male maize farmers in the study area

The findings of the multiple linear regressions of the factors affecting the income of male maize producers were provided in Table 5. Based on an econometric and statistical criterion, the semi-log equation was selected as the lead equation, as shown by the results in Table 5. According to the coefficient of multiple determination (R^2), the model's independent variables account for 73.0% of the variation in farm revenue. The exponential model fits the data well, as evidenced by the R2 and F statistics coefficient, which was significant at p 0.01.

The findings in Table 5 show that the average farm income of the male maize farmers in the research area was influenced by factors such as the number of years of formal education, the number of years of farming experience, the size of the farm, and the cost of labour. All variables, except for the labour coefficient, which was negative, had a positive impact on the farm revenue. The years of formal education coefficient was 1.653 and was statistically significant at 5% level of significance, suggesting that an increase in years of formal education will result in 1.7-unit increase in farm income.

The years of farming experience were statistically significant at 5% level of significance with a positive coefficient of 1.923. The implication of this study regarding the relationship between years of farming experience and income is that a year's worth of additional years of experience will result in 1.9 unit rise in the male maize producers farm revenue. Most often, the experience comes with age, and in traditional societies, as a woman gets older; her opinion is respected and sought-after when making decisions.

Table 5. Multiple regression analysis showing determinants of income of male farmers in the study area

Variables	**Coefficient**	**Std. Error**	**t - value**	**p-value**
(Constant)	79.8	29.23	2.73	0. 000***
Age (X_1)	-4.187	2.93	-1.43	0.125
Years of Formal Education (X_2)	1.653	0.80	2.06	0.021**
Years of farming experience (X_3)	1.923	0.92	2.10	0.033**
Farm size (X_4)	3.010	1.07	2.81	0.008***
Cost of Agrochemicals (X_5)	-2.270	1.60	-1.42	0.134
Cost of tractor operations (X_6)	- 2.295	1.91	-1.20	0.214
Cost of labor (X_7)	-1.076	0.54	-1.99	0.185**
F Statistics = 16.25				0.000
R^2 = 0.7267				
Adj R-squared = 0.6816				

Source: Field Survey Data, 2022.

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

At 1% level of significance, the farm size variable exhibited a positive coefficient of 3.010 and was statistically significant. According to this finding, increasing the size of the farm by a unit will result in 3.0-unit rise in the farm income. This is consistent with the

research by Ashley et al. (2006) and Madukwe (2004). A labor expenditure rise of 10% will result in 10% drop in farm income, according to the cost of labor, which was statistically significant at 5% level of significance and had a negative coefficient of 1.076. The economic implication of this finding of this study is the inverse relationship between farm income and costs of production.

CONCLUSION

The conclusion supports the idea that women are more effective resource users than men, as seen by the fact that the female maize farmers earn more money per hectare on average than men do, despite spending more money on the farm inputs. However, the crucial factors affecting the gender in maize farming in the study area were the years of farming experience and the farm size. Therefore, it is recommended that the farmers should expand their acreage to improve the level of farm income. Also, the relevant stakeholders should be encouraged and motivate female farmers to explore opportunities in maize farming. The government should introduce some special intervention programmes targeting female farmers since they are capable of efficient utilization of resources to achieve higher levels of farm income.

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