

Full Length Research Paper

Gender Disparities in Resource Accessibility and Their Effects on Agricultural Productivity and Livelihoods in Ogun State

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This paper aims at making a point that reducing gender disparities would promote agricultural productivity in the country. The study was carried out through a survey of 140 small-scale plantain farming households in Remo Division of Ogun State, Nigeria. This comprised of 62 female-farmers and 78 male-farmers heading households. The female-headed households suffered less access to credit facilities and farm land; however, they experienced averagely higher productivity and farm revenue. Some of the productivity indices were discovered to be statistically significantly different when comparisons are carried out between the female farmers heading households and their male counterparts. These are achieved through the use of descriptive statistics, t-test, Chow test and double logarithm regression analysis.

Key words: Gender disparities, productivity, farming households, revenue.

INTRODUCTION

Strengthening women's political voice is vital to any national development effort. This is expected to increase their effective participation in national development. Women could achieve much more in food production, provision and utilization of resources if researchers in agriculture, plant scientists, extension agents and policy makers would level the playing field for the sexes. Meeting world food needs in the coming years will depend even more than it does now on the capabilities and resources of women. Studies have shown that women actively participate in agricultural and economic growth of the developing nations (Alderman et al., 2003; Quisumbing, 2003). Brown et al. (2001) states that women are responsible for generating food security for their households in many developing countries particularly in Sub Saharan Africa (SSA). Hence, women play a significant role in national production, producing

both food and cash crops. An untapped source of productivity gains lies in addressing gender disparities in agriculture. Working within countries, especially Africa, to achieve Millennium Development Goal three and promoting gender equality and empowering women will reap the double dividend of bettering the lives of both women and children (UNICEF, 2007).

This paper aims at examining the factors that militate against the reduction of gender disparities, and comparing the productivities of both genders within the scope of small-scale plantain production in Remo Division of Ogun state, Nigeria.

Objectives of the study

This paper is aimed at examining and comparing the factors responsible for the productivity and revenue generation differentials of male and female-headed households. It also attempts to ascertain any existing disparities in their access to production inputs and outputs

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outputs and revenue. The specific objectives are:

- i) To describe the socio-economic characteristics of the households differentiated by gender in the area of study.
- ii) To determine the productivity differentials between the household types in plantain production.
- iii) To examine the income generating differentials between the two groups of households.

MATERIALS AND METHODS

Study area

This study was conducted in Remo Division of Ogun state, Nigeria. This is a major area of the state that is predominantly rural in nature. The majority of the people living in this locality were involved in farming activities either on a part time or full time basis.

Sampling techniques

One hundred and forty small-scale plantain-based farming households were sampled in the study area which included 62 female-headed and 78 male-headed farming households. Purposive sampling technique was used to select the female-headed farming households. This was due to the difficulties encountered in discovering farms that were predominantly operated by females. The male-headed farming households were selected by using simple random sampling technique.

Methodology

The data were collected during the 2008/2009 farming year. Structured questionnaire was administered and interview conducted for the selected farming households in order to collect relevant data. Descriptive statistics, the multiple regression analysis, chow test and the test of difference between means were used in meeting the objectives of this study. The socio-economic variables such as age, education, family size, farmland size, farming experience, access to credit facilities were presented through descriptive statistics. This was also used to compare the average input and output levels of the household types. The Cobb Douglas production functions were fitted to assess the factors responsible for plantain production and revenue among the selected small scale-farming households (the female-headed farming households and their male-headed counterparts). The models could be expressed as follows:

i) Production function:

$$Q = f(X_1, X_2, X_3, X_4, X_5)$$

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$$Q = a + \beta_i \sum_{i=1}^5 X_i + \mu_1$$

$$\ln Q = a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5$$

ii) Revenue model:

$$R = b_0 + b_i \sum_{i=1}^6 + \mu_2$$

$$\ln R = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6$$

Where the dependent variables are as follows:

Q = Output of plantain (bunches); R = farm revenue (naira); and μ = error term.

α , β 's = coefficients to be estimated. Double log model would be fitted as:

$$Q = f(X_1, X_2, X_3, X_4, X_5)$$

Where X_1 = land (acre); X_2 = labour (mandays); X_3 = capital (naira); X_4 = materials (naira); and X_5 = credit (naira).

For the male-headed households, it would be stated as:

$$\ln Q = \ln A + a_1 \ln X_1 + a_2 \ln X_2 + a_3 \ln X_3 + a_4 \ln X_4 + a_5 \ln X_5$$

For the female-headed households, it would be stated as:

$$\ln Q = \ln B + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5$$

For the combined male and female-headed households (using dummy variable), the model could be stated as:

$$Q = f(X_1, X_2, X_3, X_4, X_5; D)$$

$$\ln Q = \ln C + c_1 \ln X_1 + c_2 \ln X_2 + c_3 \ln X_3 + c_4 \ln X_4 + c_5 \ln X_5 + c_6 D$$

Where $D = 1$, if female-headed household; $D = 0$ if otherwise (that is, male-headed household).

These three equations would be estimated in order to meet the objective (ii), and the Chow test would be used to determine the productivity differentials between the male and female-headed household types. Similarly, this same analysis would be used to capture revenue generation differentials. The model could be stated as follows:

$$R = f(Y_1, Y_2, Y_3, Y_4, Y_5)$$

Where Y_1 = age (years); Y_2 = education (years); Y_3 = household size (number); Y_4 = farming experience (years); Y_5 = place of sale of plantain; if urban market = 1, if rural = 0.

Estimating the revenue equation for male-headed households:

$$\ln R = \ln Z + z_1 \ln Y_1 + z_2 \ln Y_2 + z_3 \ln Y_3 + z_4 \ln Y_4 + z_5 \ln Y_5$$

Estimating the revenue equation for female-headed households:

$$\ln R = \ln W + w_1 \ln Y_1 + w_2 \ln Y_2 + w_3 \ln Y_3 + w_4 \ln Y_4 + w_5 \ln Y_5$$

Estimating the combined revenue equation (using dummy variable), the model could be stated as:

$$R = f(Y_1, Y_2, Y_3, Y_4, Y_5, D)$$

$$\ln R = \ln S + s_1 \ln Y_1 + s_2 \ln Y_2 + s_3 \ln Y_3 + s_4 \ln Y_4 + s_5 \ln Y_5 + s_6 D$$

Where $D = 1$, if female-headed household; $D = 0$ if otherwise (that is, male-headed household).

These three equations would be estimated in order to meet the objective (iii), and the Chow test would be used on the three equations to determine the revenue generation differentials between the male and female-headed household types. The Chow test statistic is presented as:

$$F \sim \frac{[RSS_c(RSS_1 + RSS_2)] / k}{[(RSS_1 + RSS_2)] / (n - 2k)}$$

Table 1. Socio-economic characteristics of the households involved in plantain farming in the study area by genders.

Socio-economic characteristics (mean)	Female (n ₁ = 68)	Male (n ₂ = 72)	Average (n = 140)
Age (years)	44.00	44.83	44.46
Education (years)	10.00	10.55	10.31
Farming experience (years)	15.22	16.80	16.10
Household size (unit)	5.28	5.45	5.38
Farm size (acre)	1.78	2.33	2.08
Family labour (man day)	240.89	255.11	249.74
Hired labour (man day)	178.84	315.50	266.62
Output (bunches)	174.06	182.75	178.89
Herbicide (litres)	1.69	2.03	1.88
Credit amount (N)	8 672.53	17 375.65	13 507.60
Farm revenue (N)	129 668.75	124 812.65	126 970.83

Source: Field survey (2009).

Table 2. Proportion of farmers involved in farmers' cooperatives, credit schemes and nature of farming in the study area.

Socio-economic status	Female (unit) (n ₁ = 68)	Female (%)	Male (unit) (n ₂ = 72)	Male (%)
Farmers' cooperative members	13	19.12	16	22.22
Non-members	55	80.88	56	77.78
Credit benefactors	23	33.82	25	34.72
Non-credit benefactors	45	66.18	47	65.28
Full time farming	12	17.65	22	30.56
Part time farming	56	82.35	50	69.44

Source: Field survey (2009).

The test statistic follows the F distribution with k and $n - 2k$ degrees of freedom.

RESULTS AND DISCUSSION

Descriptive statistics of the socio-economic characteristics of the farmers

The socio-economic characteristics of the selected plantain farmers in the study area are shown in Table 1. It presents the mean values of the various socio-economic variables and production inputs. It could be observed that farms owned by females had less values compared with their male counterparts with respect to all the indices except average farm revenue. They only had slightly lower value compared with that of the male-headed households with respect to average age, education and household size. They had a little less farming experience; the amount of credit facilities enjoyed by the female farmers was more than twice lower than that of the male counterparts; they have lower access to other productive inputs such as land, labour inputs and herbicides, and their average plantain production (in bunches) was lower

than that of the male farmers heading households in the study area. However, they have moderately higher farm revenues compared to that of the male farmers heading households. Fewer female farmers heading households were involved in farmers' cooperatives and credit schemes than their male counterparts. Also, less female farmers heading households were involved in full time farming compared with the male farmers (Table 2). In spite of lower input availability experienced by the selected female farmers in the study area, especially with respect to land, labour input, herbicides, and credit facilities (as presented in Table 1), they seem to be more productive than their male counterparts.

The sampled female farmers were found to be more productive using all the productivity indices considered earlier mentioned, except for production per family labour input with which they have equal productivity level with the male folks (Table 3). Table 4 presents the T-test which compares the mean values shown in Table 3. It is evident that the female-headed households have statistically significant higher output per unit of land size and hired labour than the male-headed farming households. Also, the female-headed households have statistically significant higher farm revenue per acre of

Table 3. Average productivity comparison between selected female and male plantain farmers in the study area.

Plantain productivity indices	Female (n₁ = 68)	Male (n₂ = 72)
Bunches per acre	97.79	78.43
Bunches per man day family labour	0.72	0.72
Bunches per man day hired labour	0.97	0.58
Bunches per litre of herbicide	102.99	90.02
Bunches per naira of credit	0.02	0.01
Revenue (₦) per hectare	72 847.61	53 567.66
Revenue (₦) per man day family labour	538.29	489.25
Revenue (₦) per man day hired labour	725.05	395.60
Revenue (₦) per litre of herbicide	76 727.07	61 484.06
Revenue (₦) per naira of credit	14.95	7.18

Source: Field survey (2009).

Table 4. Comparison of means using T-test.

Degree of freedom	Critical value	T-value	Judgment
0.05, 67	1.658	12.18	There is statistical significant difference in the output of the male and female-headed farming households with respect to land size.
0.05, 67	1.658	0.74	There is no statistical significant difference in the output of the male and female-headed farming households with respect to level of family labour.
0.05, 67	1.658	2.63	There is statistical significant difference in the output of the male and female-headed farming households with respect to level of hired labour.
0.05, 67	1.658	1.35	There is no statistical significant difference in the output of the male and female-headed farming households with respect to quantity of herbicides utilization.
0.05, 67	1.658	0.55	There is no statistical significant difference in the output of the male and female-headed farming households with respect to amount of credit facilities.
0.05, 67	1.658	2.18	There is statistical significant difference in the revenue of the male and female-headed farming households with respect to land size.
0.05, 67	1.658	1.39	There is no statistical significant difference in the revenue of the male and female-headed farming households with respect to level of family labour
0.05, 67	1.658	1.82	There is statistical significant difference in the revenue of the male and female-headed farming households with respect to level of hired labour.
0.05, 67	1.658	1.90	There is statistical significant difference in the revenue of the male and female-headed farming households with respect to quantity of herbicides utilization.
0.05, 67	1.658	3.02	There is statistical significant difference in the revenue of the male and female-headed farming households with respect to amount of credit facilities.

Source: Data analysis (2009). NB: It is assumed that the weight of bunches of plantain are averagely the same across farms.

land, hired labour, litre of herbicide, and unit of credit than the male-headed farming households.

Model 1: Cobb Douglas production function for the selected female farmers

*** - 1% significant level; ** - 5% significant level; * - 10% significant level

$$\ln Q = 5.3043^{***} + 0.2141 \ln X_1^{**} - 0.0637 \ln X_2^* + 0.0067 \ln X_3 - 0.0145 \ln X_4 + 0.0265 \ln X_5^*$$

(1.7522) (0.1937) (0.0666) (0.0512) (0.1394) (0.0240)

The model aforementioned (model 1) presents the production function of plantain among the selected female farmers. Land, labour and credit facilities are considered to be significant at either 5 or 10% level of significance. The female farmers in the study area should consider increasing their productive inputs especially land size and amount of credits; these seem to enhance increased level of production on their farms. On the other hand, they should endeavour to reduce the utilization of labour input used in plantain cultivation, as there seems

to be an over-utilization of labour input. Also, reduction of the cost incurred on materials, and a boost in the level of capital may likely increase productivity of plantain in the study area.

Model 2: Cobb Douglas production function for the selected male farmers

** - 5% significant level; * - 10% significant level

$$\ln Q = 1.3550 + 0.4231 \ln X_1^{**} + 0.2551 \ln X_2^* + 0.0288 \ln X_3 + 0.1397 \ln X_4 + 0.0416 \ln X_5^*$$

(1.4502) (0.1844) (0.1725) (0.0280) (0.1166) (0.0231)

The model aforementioned (model 2) presents the production function of plantain among the selected male farmers. The most significant variables include size of land (significant at 5%), labour input and amount of credit facilities (significant at 10%). From the model, it could be observed that an increase in the size of land is critical to increase in the level of production of plantain; also, it is observed that an increase in the amount of credit and labour input would enhance an increase in output of plantain in the study area. Other variables, though not

significant, include capital and cost incurred on materials. An increase in the level of each of these materials may enhance increased productivity.

Model 3: Cobb Douglas production function for all the combined male and female farmers

** - 5% significant level; * - 10% significant level.

$$\ln Q = 2.5199^{**} + 0.3111 \ln X_1^{**} + 0.1072 \ln X_2^* + 0.0290 \ln X_3 + 0.1251 \ln X_4 + 0.0340 \ln X_5^{**} + 0.1436 \ln X_6^{**}$$

(1.1078) (0.1306) (0.1085) (0.0230) (0.0863) (0.0160) (0.1235)

The model aforementioned (model 3) presents the production function of plantain among all the selected male and female farmers. The most significant variables are size of land, labour and amount of credit (significant at 5 and 10%).

From this model, it could be observed that an increase in the size of land is essential to raise the level of production of plantain; also, it is observed that an increase in the level of labour input and amount of credit facilities would boost the increase in output level of plantain in the study area. Other variables, though not significant, include capital and cost incurred on materials. An increase in the level of each of these materials may enhance increased productivity. In addition, sex was considered as a variable (significant at 5%); a selected female farmer heading a household is scored 1, otherwise that is, a male farmer heading a household is scored 0. From the model, female farmers heading households were observed to be more productive than their male counterparts.

Determining the significant difference in the productivity of the farmers by gender

The calculated F value for the Chow test is 6.2025, while the tabulated F value is 2.25. The calculated F value exceeds the critical value in the table; hence, the null hypothesis is rejected. The alternate hypothesis that there is statistically significant difference between the female and the male farmers with respect to farm productivity is accepted. It could therefore be concluded that the female farmers were more productive than their male counterparts.

Model 4: Revenue generation model for the selected female farmers with respect to revenue derivable from plantain production

*** - 1% significant level; ** - 5% significant level; * - 10% significant level.

$$\ln R = 13.9834^{***} - 0.7295 \ln Y_1^* + 0.0079 \ln Y_2^{**} - 0.4859 \ln Y_3 + 0.4276 \ln Y_4^* + 0.3175 \ln Y_5^{**}$$

(3.1509) (1.0085) (0.1492) (0.4507) (0.8412) (0.4452)

The result of this model (model 4) presents the function of revenue generation for the selected female farmers. Age, level of education, farming experience and place of product sales are considered to be significant at either 5 or 10% level of significance. It was observed that the younger female farmers in the study area seemed to have higher revenue generating capacity from plantain production than the older female farmers. Female farmers with relatively higher level of education seemed to have better capacity for revenue generation than those with lower educational level. Female farmers with relatively more years of farming experience were observed to have higher revenue than the ones with fewer years of experience. Place of product sales

seemed to contribute to increased revenue generation among the selected female farmers. Those female farmers that have urban markets as their point of sales seemed to have better revenue generation capacity than those adopting rural markets.

Place of product sales was measured as dummy variable: a farmer having urban market as the point of sales is scored 1; otherwise is scored 0.

Model 5: Revenue generation model for the selected male farmers with respect to revenue derivable from plantain production

$$\ln R = 13.1185^{***} - 1.1313 \ln Y_1^* + 0.1032 \ln Y_2 - 0.6704 \ln Y_3 - 0.4865 \ln Y_4^* + 0.3672 \ln Y_5^*$$

(2.8877) (0.8283) (0.1336) (0.6206) (0.2584) (0.2390)

*** - 1% significant level; * - 10% significant level.

It could be observed from this model (model 5) that the most significant variables include age, experience and place of sale of farm produce (significant at 10%). The younger male farmers in the study area seemed to have higher revenue generating capacity from plantain production than the older male farmers. Male farmers with relatively more years of farming experience were seemed to have higher revenue than those with fewer

years of experience. The place of sale of farm produce was measured as a dummy variable: urban market is scored 1; rural market is scored 0. Having urban market as a place of sales of farm produce seemed to enhance improved farm revenue of the selected male farmers.

Model 6: Revenue generation model for the combined male and female farmers with respect to revenue derivable from plantain production

$$\ln R = 12.9406^{***} - 0.7672 \ln X_1^{**} + 0.0167 \ln X_2 - 0.0823 \ln X_3 + 0.4768 \ln X_4^{**} + 0.4286 \ln X_5^{**} + 0.2320 \ln X_6^{***}$$

(2.0779) (0.6056) (0.0949) (0.3342) (0.2407) (0.2032) (0.1892)

*** - 1% significant level; ** - 5% significant level; * - 10% significant level.

The most significant variables in this model 6 include age, education, place of sales of farm produce and years of farming experience (significant at 5 and 10%). The younger farmers in the study area seemed to have higher revenue generating capacity from plantain production than the older farmers. Farmers with relatively more years of farming experience were observed to have higher revenue than the ones with fewer years of experience. The place of sale of farm produce is measured as dummy variable, as in model 5 earlier mentioned. It could be observed that having urban market as a place of sales of farm produce seemed to enhance improved farm revenue of the selected farmers. Furthermore, an additional sex variable of the farmer was introduced in this model (significant at 1%). It was measured as a dummy variable: a female farmer heading a household is scored 1, otherwise is scored 0. From the result of the analysis, the selected female farmers tend to have better potential for higher farm revenue generation than the selected male counterparts.

Determining the significant difference in farm revenue generation of the farmers by gender

The calculated F value for the Chow test is 5.4627, while the tabulated F value is 2.17. The calculated F value exceeds the critical value in the table, hence, the null hypothesis is rejected for the alternate hypothesis to be accepted that there is statistically significant difference between the female and the male farmers with respect to farm income generation. It could therefore, be concluded that the female farmers were more promising in farm income generation than their male counterparts.

Summary of findings

From the aforementioned stated results, it could be observed that:

i) The female farmers in the study area were at disadvantage in obtaining of some production inputs when compared to their male counterparts; such inputs include land, hired labour and credit facilities.

ii) Fewer proportion of these female farmers were involved in farmers' cooperatives and credit schemes, and they were mainly involved in part time farming unlike the male folks whose a good number in the study area was involved in full time farming activities.

iii) In spite of their disadvantages, the sampled female farmers in the study area were found to have higher average revenue generation from their farms, though they also have lower average production level from their farms; however, it was discovered that there is significant difference between the two groups with respect to their output levels and revenues. Also, average productivity comparison shows that the selected female farmers had higher productivity than the selected male farmers.

iv) It was observed that age, farming experience and making urban centre as a point of sales were the most significant socio-economic characteristics that could enhance productivity in the study area among the farmers. Education appears to be an important socio-economic variable enhancing farm income generation among the female farmers.

v) It was noticed that land size, labour input and amount of credit facilities benefitted by the farmers were important production variables essential for improved productivity in the study area.

vi) The farmers who had access to urban markets as point of sales of farm produce were discovered to be more advantageous with respect to farm revenue generation than those who only had access to rural markets.

vii) Moreover, female farmers heading households seemed to have higher productivity and farm revenue generation than their male counterparts.

Conclusion and Recommendations

This study clearly shows that the female farmers have potential to out-perform the male farmers, if all the necessary production inputs are made available to them at least at an equal level with the male farmers. In order for the women and female-headed households to be encouraged towards achieving relatively higher agricultural productivity in the developing economies like Nigeria, the following suggestions should be taken into consideration:

1) Women at all ages, especially the younger female farmers should be given exposures that would enhance greater productivity, hence, ensuring a better livelihood for their households in particular and the nation in general.

2) The younger women in agriculture should be encouraged by all means possible; this may include organizing a group that would mainly comprise of younger women involved in agricultural practices through

which training as well as productive inputs could be made available towards achieving greater agricultural yields.

3) There should be conscious effort made toward enabling women folk to enjoy considerably suitable access to land and credit facilities in the study area.

4) Financial institutions offering credit facilities should endeavour to make every effort toward ensuring that credits are given to farmers of all categories of age and gender, and that such are judiciously utilized.

5) Every institutional organization that may encourage improvement in the productivity and farm revenue generation of women farmers and female-headed household farms should be put in place. Such organizations should specially consider effecting a tangible increase in the volume of credits offered the women farmers, and encouraging them toward membership of functional farmers' cooperatives, hence enhancing their access to credit facilities.

Finally, it is very crucial to make all necessary productive inputs available for the women folks that are involved in agricultural practices. Making similar provisions for women farmers just as for their male counterparts, and implementing a level playing field for both genders and household types would help in moving nearer toward attaining the goal of national food security.

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