Feed the Future Innovation Lab for Food Security Policy

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Nigeria Agricultural Policy Project

Estimation of the Difference in Agricultural Yield Between Male and Female Farmers in Nigeria

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Objectives

Nigeria has abundant land and water resources and her agricultural sector has high growth potentials, but due to various factors like increasing climatic conditions, land fragmentation and years of gender blind policies, the sector has not performed as expected. Farming is mostly done on a small scale and it is mostly rain-fed thereby making the production system weather sensitive. Large scale farming and irrigation practices are still underutilized in several parts of the country.

Women who are the backbone of the agricultural sector contribute an estimated 60 to 80% of agricultural labour, they have been noted to do as much labour as the men but their contributions to agricultural production and growth have been under rated in various agricultural and economic analyses (Jiggins et al (1997) and Steunou, (2009)). They play major roles in the production, processing and marketing of agricultural commodities in Nigeria.

Even though women are involved in a wide range of agricultural activities, they have limited access to agricultural resources and have restricted decision-making power on their farm plots compared to their male counterparts (FAO, 2011). These limitations are likely to have an effect on women's production levels when compared with that of men. But other factors such as variations in temperature and rainfall may contribute to the differences in output of men and women.

In order to ascertain the causes of this unequal relationship in the agricultural sector, with respect to climate change, this study used the Oaxaca-Blinder decomposition method to determine the difference in yield of male and female farmers in the Southern and Northern region of the country using the LSMS-ISA data set as well as climate data which was extracted from worldbioclim.com at the Local government area level and was added to the LSMS-ISA data set using longitude and latitude coordinates.

Key Highlights

- On average, male farmers have higher household assets and higher harvest value than female farmers. Female farmers are less involved in mechanized and irrigation farming and use less fertilizer.
- Uncertain fluctuations in climatic conditions leads to a decrease of crop yields of farmers in Nigeria. Climate variables also indirectly contribute to the difference in yields between male and female farmers in Nigeria, but its indirect contribution to crop yield was not estimated.
- Differences in level of education, wealth status and access to irrigation might account for a part of the harvest value gap.

Method of Data Collection

This study used the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) which consist of two waves 2010/2011 (Wave 1) and 2012/2013 (Wave 2). The data was collected by teams consisting of a supervisor, between 2 and 4 interviewers, and a data entry operator.

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Households were visited at two points in time; right after planting which was the post-planting visit and after harvest which was the post-harvest visit. During these visits, information was gathered on the household demographical structure, education, labour, assets, and farm and nonfarm income generating activities.

Data Analysis Technique

The Oaxaca Blinder Decomposition method was used to examine the yield difference between male and female farmers.

An Overview: The Oaxaca-Blinder Decomposition

The Oaxaca-Blinder (O-B) decomposition method was developed by Oaxaca (1973) and Blinder (1973), to examine wage gap between white males and white females, as well as white males and black males. The O-B decomposition method calculates the gap between means of a dependent variable that is continuous or unbounded for two groups, and states the contribution of each independent variable to the difference in the dependent variable between the groups of interest.

This study using the Oaxaca Blinder decomposition model investigated the differences in yield between male and female farmers in Nigeria which was represented as:

$$R = \overline{H}_m - \overline{H}_f$$

Where

R = Mean Difference in yield value

$\overline{H}_m$ = Mean log yield value for male farmers

$\overline{H}_f$ = Mean log yield value for female farmers

In order to understand the difference in yield value of male and female farmers in Nigeria, we estimated a counterfactual equation (intercept and coefficient of female farmers' equation who are the disadvantaged group replaced with those from the male farmers' equation who are the advantaged group):

$$H * female$$

So the difference in yield value between male and female farmers was:

$$R = \overline{H}_m - \overline{H}_f = (\overline{H}m - H * female) + (H * female - \overline{H}f)$$

The first component $(\overline{H}m - H * female)$ is the endowment effect, also known as the explained effect is the part of the yield value difference which is explained by group differences in the independent variables, and the second component :

The second component $(H * female - \overline{H}f)$ is the coefficient effect also known as the unexplained effect which is usually attributed to discrimination, it is important to note that it also captures all the potential effects of differences in the unobserved variables.

In the three-fold decomposition, a third component known as the interaction term accounts for the fact that differences in endowments and coefficients exist simultaneously between male and female farmers in Nigeria.

Results

- The result of the test of mean difference of selected socio-economic variables by gender shows that on average, male farmers have higher household assets than female farmers, they also have higher harvest value when compared to the women. The female farmers are less involved in mechanized farming which may contribute to their low harvest value. The results also revealed that female farmers are less involved in irrigation farming and do not use fertilizer as much as male farmers.

- Some selected climate variables like annual mean temperature and annual precipitation affects yields of crops in Nigeria, the uncertain fluctuations in climatic conditions leads to a decrease of crop yields of farmers in Nigeria. Climate variables also indirectly contribute to the difference in yields between male and female farmers in Nigeria, but its indirect contribution to crop yield was not estimated.

- The Oaxaca Blinder decomposition output reports for male and female farmers in Southern Nigeria

Table 1: Summary Statistics of Farmers in Nigeria

Variables	Male		Female			
	Mean	S.D	Mean	S.D	Gender Gap	T
Household Asset (Naira)	111278.9	448935.9	91024.67	205386.1	20254.21	2.01**
Harvest Value	483370.8	6193682	280257.8	1116992	203113.1	0.52
Mechanization	.0532787	.2246008	.0294957	.1692316	.023783	4.56*
Irrigation Use	.0236195	.1518687	.0052331	.0721679	.0183864	5.41*
Fertilizer Use	.4186634	.4933671	.2145278	.4105938	.2041356	17.47*

Table 2: Oaxaca Blinder Decomposition for Farmers in Southern Nigeria

Male farmers	10.016***	
	(0.073)	
Female farmers	9.234***	
	(0.156)	
Predicted difference	0.782***	
	(0.172)	
Endowment effect		0.543**
		(0.190)
Coefficient effect		0.580**
		(0.180)
Interaction term		-0.341*
		(0.196)
Observations	449	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Computed from LSMS-ISA data (2010/2011 and 2012/2013)

Table 3: Oaxaca Blinder Decomposition for Farmers in Northern Nigeria

Male farmers	9.713***	
	(0.036)	
Female farmers	9.291***	
	(0.214)	
Predicted difference	0.422*	
	(0.217)	
Endowment effect		0.020
		(0.208)
Coefficient effect		0.366*
		(0.213)
Interaction term		0.036
		(0.204)
Observations	1,036	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Computed from LSMS-ISA data (2010/2011 and 2012/2013)

- a harvest value gap of 0.78. The endowment effect was 0.543 which indicates that differences in level of education, wealth status and access to irrigation might account for a part of the harvest value gap. The coefficient effect was 0.580.

Policy Recommendations

Policymakers and agribusiness stakeholders may look to reduce the gender gap existing between farmers in the country by empowering women in various ways for example by providing them access to land area, fertilizer, mechanization which will bring about an increase in their farm yields. This will effectively close the gender gap. Also, further research into how these climate variables contribute to this gender difference is needed to fully understand what programs and policies can be developed for male and female farmers in order to effectively close the gender gap.

Figures 1 and 2: Level of Education for Farmers in Nigeria

Figure 1: Level of Education for male Farmers

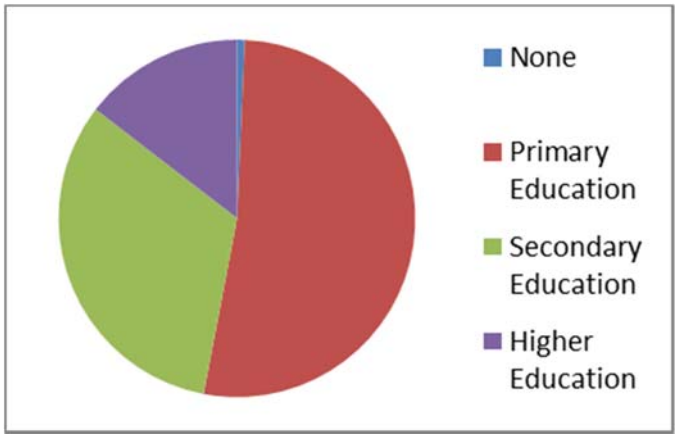
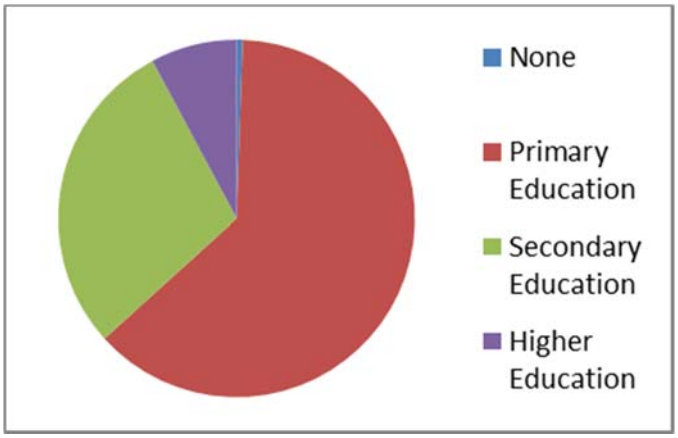


Figure 1: Level of Education for female Farmers



Source: Computed from LSMS-ISA data (2010/2011 and 2012/2013)

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