

## **THE EFFECTS OF FORMAL EDUCATION AND COOPERATIVE MEMBERSHIP ON THE FARM SIZE CULTIVATED BY FARMERS IN ABUJA, NIGERIA**

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### **ABSTRACT**

The study examined the effects of formal education and cooperative membership on the farm size cultivated by farmers in Abuja, Nigeria. The study population comprised cooperative and non-cooperative farmers who had no formal school education and those who had primary school education, secondary school education and post secondary school education. To reach these 8 farmer-categories (FAG), a purposive technique was adopted for sample selection while semi-structured questionnaires were used for data collection. A sample of 240 respondents made up of 30 farmers from each of the categories was used for the study. A two-way analysis of variance (ANOVA) was used for data analysis. Results indicated that irrespective of farmers' educational status, there was significant difference ( $p < 0.05$ ) in the farm size of the cooperative and non-cooperative farmers. The mean farm size indicated that cooperative farmers cultivated larger farm size (2.24ha) than non-cooperative farmers (1.96ha). Similarly, irrespective of cooperative membership, there was no significant ( $p > 0.05$ ) effect of farmers' educational status on the farm size but the mean farm size for farmers who had post secondary school education (2.41ha) was relatively higher compared with others. Furthermore, there was no significant ( $p > 0.05$ ) interaction effect of cooperative membership and education on the size of land cultivated. Based on the result of the interaction of cooperative membership and farmers' educational status, the paper concluded that the educational status of a cooperative or non-cooperative farmer was not a major determinant of the farm size cultivated in the study area.

**Keywords:** cooperative farmers, non-cooperative farmers, no formal school, primary school, secondary school, post secondary school

## INTRODUCTION

Nigeria is one of the countries in the world that depends on agriculture for survival because an estimated 76 percent of her population lives in rural communities and about 90 percent of them are engaged in agriculture (UNICEF, 2008). Agriculture and crude oil are the major contributors to Gross Domestic Product (NBS, 2012). The major actors in the agricultural production drama are the small-scale farmers who are scattered all over the country. One of the greatest challenges facing the nation as an agrarian economy is that the small-scale farmers cultivate small portions of farm lands. The challenge has been a subject for debate not only in Nigeria but in other countries like India (Gul Unal, 2008). It is one of the major challenges because in spite of the large number that is engaged in agriculture, Nigeria is finding difficult to feed her population which has been estimated at 163 million people (UKAID, 2012). To close the gap between food demand and supply, importation of food items was one of the measures adopted (Okolo, 2004).

Over the years, one of the approaches which the Government of Nigeria (at all levels) adopted to improve the size of the land cultivated was to encourage the small scale farmers to form and/or join cooperative societies. The Government's interest in cooperative societies was predicated on the roles they play in sustainable agricultural development. The implicit assumption is that by joining cooperative societies, farmers will reap the benefits of social capital organizations (Valentinov, 2003). Cooperative societies have been found to be very useful in agricultural transformation and sustainable development because they have the potentials to improve farmers' output and productivity. A study by Ibezim, Okoroigwe and Ijioma (2010) indicated that there was significant difference in the output, income and farm size of cooperative and non-cooperative farmers. Bamire, Adejobi, Akinola, and Olagbaju (2007) also reported that a 10 percent increase in cooperative membership increased maize farmers' net earnings by 10.4 percent. Other authors (Adeyemo, 1994; Holloway, Nicholson, Delgado, Staal and Ehui, 2000; Bian, 2002 and Agbo, 2009) have also reported that cooperative societies are vehicles for agricultural transformation. To sustain, promote and create an enabling environment for the cooperative societies to operate, a department of agricultural cooperatives was created within the Federal Ministry of Agriculture, Water Resources and Rural Development in 1979. It was created solely for the actualization of the policy that was aimed at encouraging the formation of cooperative societies (Daniel and Ihechituru, 2002). The Nigerian Cooperative Societies Act of 1993 was also enacted in line with the international best practices (Federal Republic of Nigeria, 1993) to show government's interest in cooperative societies.

Apart from cooperative societies, the Nigerian Government equally placed emphasis on farmers' education as one of the factors that can improve agriculture and sustainable rural development. Agricultural science as a subject was made compulsory in primary and secondary schools but at post secondary school education, it was a matter of interest. Government's interest in farmers' education is rooted in the importance of education in agricultural development. Doss and Morris (2001) stated that education is an important determinant of farmers' ability to understand and manage unfamiliar technologies. The coefficient of education according to Nenna (2011) positively correlated with farm income and significant at 5 percent alpha level implying that farmers with higher educational status earned higher income compared with less educated farmers. Onwumere, Alamba and Iwuji (2011) reported that education is an important factor in the adoption of new technologies. Four years of primary education according to Mareila (1991) increased productivity by 7.4 percent among other benefits. Other studies (UNICEF, 2000; Alliance for Africa, 2002; Nigerian National Gender

Policy, 2006; Imonikhe, 2010; Simonyan, Olukosi and Omolehin, 2010) have also emphasized the importance of education in our society.

The available evidence on the contributions of cooperative societies and farmers' education to agriculture and sustainable development made them subjects for critical research hence the main objective of the study is to determine the effects of farmers educational status and cooperative membership on farm size. The study is very important because in order to improve and sustain food production and other agricultural raw materials needed to boost the economy, one of the challenges that Nigeria must address is how to improve the farm size cultivated by the small scale farmers that are actively involved in agriculture. Again, it is vital because a study by Ironkwe, Ekwe, Okeye and Chukwu (2009) indicated that a unit increase in farm size increased cassava output by 3.05kg. Similarly, Awotide, Fashina, Ologbonjo and Agbola (2008) and Bamire, Adejobi, Akinola and Olagbaju (2007) showed that farm size significantly influenced the output of maize. The authors reported that increased yield in maize was associated with expanded land area. Since farm size is one of the determinants of farm output and empirical evidence has shown that farmers' educational status and cooperative membership play significant roles in agriculture and sustainable rural development, there is every need to find out if the two variables independently and/or jointly affect the farm size cultivated by farmers hence the questions are:

- (1) Do cooperative farmers who have no formal school education cultivate larger farm size than their counterparts who do not belong to any cooperative societies?
- (2) Do cooperative farmers who have primary school education but are members of cooperative societies cultivate larger farm size than their counterparts who do not belong to any cooperative society?
- (3) Do cooperative farmers who have secondary school education but are members of cooperative societies cultivate larger farm size than their counterparts who do not belong to any cooperative society?
- (4) Do cooperative farmers who have post secondary school education but are members of cooperative societies cultivate larger farm size than their counterparts who do not belong to any cooperative society?

## **OBJECTIVES OF THE STUDY**

The broad objective of the study is to determine the effects of education and cooperative membership on the farm size cultivated by small-scale farmers in Abuja, Nigeria. Specific objectives are to:

- 1) Determine if there are differences in the farm size cultivated by cooperative and non-cooperative farmers.
- 2) Determine if there are differences in the farm size cultivated by farmers who had no formal school education, primary school education, secondary school and post secondary school education
- 3) Determine if cooperative membership and farmers' educational status jointly affect the farm size cultivated by the small-scale farmers.

## HYPOTHESES

- 1) Ho: There is no significant difference in the farm size cultivated by the cooperative and non-cooperative farmers ( $\mu_{\text{cooperative}} = \mu_{\text{non-cooperative}}$ ).
- 2) Ho: There is no significant difference in the farm size cultivated by farmers who have no formal school education, primary school education, secondary school education and post secondary school education ( $\mu_{\text{no-formal}} = \mu_{\text{primary}} = \mu_{\text{secondary}} = \mu_{\text{post-secondary}}$ ).
- 3) Ho: There is no significant interaction effect of cooperative membership and farmers' educational status on the farm size cultivated ( $\mu_{\text{FAG1}} = \mu_{\text{FAG2}} = \mu_{\text{FAG3}} = \mu_{\text{FAG4}} = \mu_{\text{FAG5}} = \mu_{\text{FAG6}} = \mu_{\text{FAG7}} = \mu_{\text{FAG8}}$ ).

## RESEARCH METHODOLOGY

This study was conducted in Abuja, Nigeria which is located between latitudes  $8^{\circ}25'$  and  $9^{\circ}25'$  N and longitudes  $6^{\circ}45'$  and  $7^{\circ}45'$  E. The territory covers an area of 8,000 square kilometers, lying in the centre of the country and is bordered on all sides by four states namely: Niger, Nasarawa, Kogi and Kadunna (Dawan, 2000). The population for the study comprised 8 farmer-categories (FAG) namely: 1) farmers who had no formal school education and were not members of cooperative societies (FAG1), 2) farmers who had no formal school education but were members of cooperative societies (FAG2), 3) farmers who had primary school education and were members of cooperative societies (FAG3), 4) farmers who had primary school education but were not members of cooperative societies (FAG4), 5) farmers who had secondary school education and were members of cooperative societies (FAG5), 6) farmers who had secondary school education but were not members of cooperative societies (FAG6), 7) farmers who had post secondary school education and were members of cooperative societies (FAG7), and 8) farmers who had post secondary school education but were not members of cooperative societies (FAG8). A total of 30 farmers from each of these 8 farmer-categories were used for the study giving a total of 240 respondents. To access these categories of farmers, a purposive technique was adopted for sample selection while structured questionnaires were used for data collection. Agricultural extension agents in the four zones (central, eastern, northern and western) were used as enumerators. Equal numbers (30 farmers) from each of the eight farmer-categories were used to minimize biasness that may arise as a result of having more respondents from any of the 8 categories. The two independent factors in this study are cooperative membership and education while the dependent variable is the farm size cultivated. The cooperative membership has two levels (cooperative and non-cooperative farmers) while education has 4 levels (no formal school education, primary school education, secondary school education and post secondary school education). The combination gave  $2 \times 4$  mixed factorial ANOVA with 8 treatment combinations (the 8 farmer-categories). This is an independent measure ANOVA (Andy, 2005) and it is mathematically expressed as:

$$Y_{ij} = \mu + CP_i + ED_j + CPED_{ij} + e_{ij}$$

Where:

$Y_{ij}$  = Individual farmer's farm size cultivated (hectare)

$\mu$  = General mean

$CP_i$  = Refers to the effects of cooperative membership (cooperative or non-cooperative farmers) on the farm size cultivated

**ED<sub>j</sub>** = Refers to the effects of education (no formal school education, primary school education, secondary school education and post secondary school education) on the farm size cultivated

**CPED<sub>ij</sub>** = interaction effect of cooperative membership and education

**e<sub>ij</sub>** = error term

The model expressed the relationship between the dependent variable (the farm size cultivated) and the independent variables (cooperative membership and education). By implication, the model tests the hypotheses that the size of land (farm size) cultivated by a farmer ( $Y_{ij}$ ) depends on cooperative membership ( $CP_j$ ); the educational status of the farmer ( $ED_j$ ); and the interaction (joint) effects of cooperative membership and educational status ( $CPED_{ij}$ ). The  $\mu$  is a constant (the population mean) and thus does not contribute to any variation in the observed differences (Aggarwal, 2002) while the  $e_{ij}$  is the error term. The size of land cultivated by the farmers was measured in hectare. The analysis was in line with the method adopted by Andy (2005), Robert (2011), Gray and Kinnear (2011) and Ajah (2012). SPSS 15.00 was used to run the analysis and it was tested at 5% probability level. The post secondary school education includes farmers with Ordinary National Diploma (OND), Higher School Certificate (HSC), Nigerian Certificate of Education (NCE), Higher National Diploma (HND) and Bachelor degrees.

## RESULTS AND DISCUSSION

Table 1 shows the analysis of variance result of the effects of education and cooperative membership on the size of land (farm size) cultivated by the farmers. The “cooperative membership” row of the ANOVA table shows the effects of cooperative membership on farm size (the main effect of cooperative membership). It tests the hypothesis that there is no difference in the farm size cultivated by the cooperative and non-cooperative farmers ( $\mu_{\text{cooperative}} = \mu_{\text{non-cooperative}}$ ). The result,  $F(1, 232) = 3.75, p = 0.04$ , indicated that there was significant difference ( $p < 0.05$ ) in the mean farm size cultivated by the cooperative and non-cooperative farmers hence the null hypothesis was rejected. In other words irrespective of education, cooperative membership had effect on the farm size cultivated by the farmers. This agrees with the findings by Ibezim, Okoroigwe, and Ijioma (2010) and Kehinde, Ayandiji, Awoniji and Akiwumi (2009) which reported that cooperative members cultivated larger farm lands than non-cooperative farmers. Other studies by Holloway, Nicholson, Delgado, Staal, and Ehui (2000) and Agbo (2009) reported similar differences in other areas between cooperative and non-cooperative farmers but not on farm size. Again, the “educational status” row of the ANOVA table contains the result of the effects of farmers’ educational status on farm size (the main effect of formal education). It tests the hypothesis that there is no difference in the farm size cultivated by farmers who had no formal school education, primary school education, secondary school education and post secondary school education ( $\mu_{\text{no-formal}} = \mu_{\text{primary}} = \mu_{\text{secondary}} = \mu_{\text{post-secondary}}$ ). The result,  $F(3, 232) = 2.48, p = 0.06$ , revealed that the farmers’ educational status didnot significantly ( $p > 0.05$ ) affect farm size. This implies that irrespective of cooperative membership, there was no significant difference ( $p > 0.05$ ) in the mean farm size cultivated by the farmers who had post secondary school education, secondary school education, primary school education and no formal school education hence the null hypothesis was accepted. This result is contrary to apriori expectation because it was expected that farmers with higher educational status would cultivate larger farm size. This was expected because studies by Doss and Morris (2001); Onwumere, Alamba and Iwuji (2011) and Mareila (1991) indicated that education has significant impact on agriculture and sustainable rural development. Furthermore, the “coop membership\*education” row of the ANOVA table contains the result of the interaction effects of

cooperative membership and farmers' educational status. It tests the hypothesis that there is no significant difference in the farm size cultivated by each of the 8 farmer-categories ( $\mu_{FAG1} = \mu_{FAG2} = \mu_{FAG3} = \mu_{FAG4} = \mu_{FAG5} = \mu_{FAG6} = \mu_{FAG7} = \mu_{FAG8}$ ). The result,  $F(3, 232) = 1.63$ ,  $P = 0.18$ , showed that there was no significant ( $p > 0.05$ ) interaction effects of cooperative membership and farmers' educational status on farm size. The result of the interaction of cooperative membership and farmers' educational status shows that belonging to any of the eight farmer-categories did not significantly ( $p > 0.05$ ) affect the farm size cultivated by the farmers.

Table 2 shows the mean farm size cultivated by the small-scale farmers. The result showed that irrespective of the farmers' educational status, cooperative farmers cultivated farm land ( $2.24^a$ ) that was significantly ( $p < 0.05$ ) higher than the non-cooperative farmers ( $1.96^b$ ). On the other hand, irrespective of cooperative membership, farmers who had post secondary school education cultivated relatively larger farm size than farmers who had no formal school education, primary school education and secondary school education. Apart from the mean farm size of the farmers who had primary school education, there is a gradual increase in the farm size cultivated by those who had no formal school education ( $1.97\text{ha}$ ) to those who had post secondary school education ( $2.41\text{ha}$ ). Generally, the results revealed that irrespective of cooperative membership, farmers who had post secondary school education cultivated larger farm size than those who had at most secondary school education.

Table 3 shows the eight farmer-categories' mean farm size. Although there was no significant difference in the mean farm sizes, the results revealed that the farmers who had post secondary school education but were not members of cooperative societies (FAG8) cultivated  $2.50\text{ha}$  of land and it was the highest. This is followed by farmers who had post secondary school education and were members of cooperative societies (FAG7) ( $2.32\text{ha}$ ). On the other hand, farmers who had primary school education but were not members of cooperative societies cultivated the least farm size ( $1.64\text{ha}$ ). Remarkably, the results revealed that: 1) there was no significant difference ( $p > 0.05$ ) in the farm size cultivated by cooperative farmers who had no formal school education and their counterparts who did not belong to any cooperative society ( $\mu_{FAG1} = \mu_{FAG2}$ ); 2) there was no significant difference ( $p > 0.05$ ) in the farm size cultivated by cooperative farmers who had primary school education and their counterparts who did not belong to any cooperative society ( $\mu_{FAG3} = \mu_{FAG4}$ ), 3) there was no significant difference ( $p > 0.05$ ) in the farm size cultivated by cooperative farmers who had secondary school education and their counterparts who did not belong to any cooperative society ( $\mu_{FAG5} = \mu_{FAG6}$ ), and 4) there was no significant difference ( $p > 0.05$ ) in the farm size cultivated by cooperative farmers who had post secondary school education and their counterparts who did not belong to any cooperative society ( $\mu_{FAG7} = \mu_{FAG8}$ ).

Table 4 shows the socio-economic characteristics of the small-scale farmers studied. The gender distributions of the farmers revealed that majority ( $84.58\%$ ) of them were males. This does not mean that women were less involved in agricultural production in the study area but it reflects the difficulties of accessing women for data collection because of religion (Islam). Looking at the years of farming experiences, the result showed that most of the male farmers ( $35.83\%$ ) had between 11 - 20 years of farming experiences. This shows that the farmers had enough farming experiences that can aid positive transfer of learning. Majority of the farmers ( $65.00\%$ ) had household size greater than 6 persons. The age distribution indicated that greater number of the farmers were within the age group of 31 – 50 years. Psychologically, farmers in this age group are able to carry out farming activities because the cognitive, affective and psychomotor domains are still active.

## CONCLUSION

The emphasis placed on cooperative membership and formal education in agriculture and rural development necessitated this study. Hence, to promote and ensure sustainable development in the agricultural sector, an understanding of the impact of cooperative membership and formal education on agriculture is very important. The main objective is to determine if cooperative membership and farmers' educational status affect the farm size cultivated by small-scale farmers. Results indicated that irrespective of the farmers' educational status, there was significant difference ( $p < 0.05$ ) in the farm size cultivated by the cooperative and non-cooperative farmers. This implies that to improve and sustain the size of land cultivated by the small-scale farmers, government should encourage the farmers to form and/or join viable cooperative societies. This is very important because, all things being equal, it is a fact that the size of land cultivated is positively related to the output. On the contrary, irrespective of cooperative membership, there was no significant ( $p > 0.05$ ) effect of farmers' educational status on farm size. In addition, there was no significant ( $p > 0.05$ ) interaction effect of cooperative membership and farmers' educational status on the farm size cultivated implying that belonging to any of the eight farmer-categories did not significantly affect the farm size cultivated by the farmers. Based on the results of the interaction effect of cooperative membership and farmers' educational status, the paper concluded that the educational status of a cooperative or non-cooperative farmer was not a major determinant of the farm size cultivated in the study area. It is therefore recommended that the study should be replicated in other places to see if similar results apply.

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## APPENDIX:

The results of the analysis are presented in tables 1-4 below.

**Table 1** ANOVA results on the effects of cooperative membership and education on the farm size cultivated

Sources of Variation	Df	SS	MS	F-cal	P-value	Sig
Cooperative membership	1	4.43	4.73	3.75	0.04	S
Educational status	3	9.38	3.13	2.48	0.06	NS
Coop membership*Education	3	6.17	2.07	1.63	0.18	NS
Error (between factor)	232	293.06				
<b>Total</b>	<b>239</b>	<b>313.34</b>				

Source: Survey data, 2012

**Table 2** Mean farm size (hectare) cultivated by the small-scale farmers

Educational status	Cooperative Membership		Row mean total
	Cooperative farmer	Non-cooperative farmer	
No formal education	2.30	1.65	1.97 <sup>a</sup>
Primary school	2.14	1.64	1.89 <sup>a</sup>
Secondary school	2.21	2.06	2.14 <sup>a</sup>
Post secondary school	2.32	2.50	2.41 <sup>a</sup>
<b>Column mean total</b>	<b>2.24<sup>a</sup></b>	<b>1.96<sup>b</sup></b>	<b>2.10</b>

Note: Mean with the same alphabet did not significantly differ from each other

Source: Survey data, 2012

**Table 3** Farmer-categories' mean farm size arranged in a descending order

<b>Farmer-categories</b>	<b>Mean farm size (ha)</b>
Farmers who had post secondary school education but were not members of cooperative societies (FAG8)	2.50
Farmers who had post secondary school education and were members of cooperative societies (FAG7)	2.32
Farmers who had no formal school education but were members of cooperative societies(FAG2)	2.30
Farmers who had secondary school education and were members of cooperative societies (FAG5)	2.21
Farmers who had primary school education and were members of cooperative societies (FAG3)	2.14
Farmers who had secondary school education but were not members of cooperative societies (FAG6)	2.06
Farmers who had no formal school education and were not members of cooperative societies (FAG1)	1.65
Farmers who had primary school education but were not members of cooperative societies (FAG4)	1.64

**Source:** Survey data, 2012

**Table 4** The socio-economic characteristics of the small-scale farmers

<b>Socio-economic characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
Gender		
Male	203	84.58
Female	37	15.42
<b>Total</b>	<b>240</b>	<b>100</b>
Years of farming experience		
1 - 10	43	17.92
11 - 20	86	35.83
21 - 30	82	34.17
> 30	29	12.08
<b>Total</b>	<b>240</b>	<b>100</b>
Household size		
1 - 2	11	4.58
3 - 4	11	4.58
5 - 6	62	25.84
> 6	156	65.00
<b>Total</b>	<b>240</b>	<b>100</b>
Age (years)		
≤ 20	0.00	0.00
21 - 30	26	10.83
31 - 40	93	38.76
41 - 50	92	38.33
> 50	29	12.08
<b>Total</b>	<b>240</b>	<b>100</b>

**Source:** Survey data, 2012