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HEALTH STATUS AND PRODUCTIVITY ANALYSIS OF RURAL FARMING HOUSEHOLDS IN ABIA STATE, NIGERIA

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Abstract

This study analyzed the relationship between farmers' health status and their productivity levels in Abia state. A multi-stage sampling technique was adopted in collecting data for this research, thus, a total of 1080 farmers were selected. Simple descriptive statistics, the total factor productivity and ordinary least squares methods were employed in the data analysis. A mean productivity value of 1.895 implies that an average farmer made about 89 kobo for every one naira invested. Healthy farmers had a higher mean productivity (2.1246) than non-healthy farmers (1.9018). The regression model gave an R^2 of 0.594, 0.458 and 0.892 implying that 59.4%, 45.8% and 89.2% changes in the productivity of the three groups (pooled, healthy and non-healthy farmers) were accounted for by changes in the explanatory variables included in the model. The study showed that healthy farmers with access to appropriate inputs (including knowledge, land, tools, fertilizer, and seeds) had higher productivity and earned good incomes than non-healthy farmers, thus health improvement strategies granted to the farmers by government will allow them to thrive nutritionally, acquire more assets (including health), and become more resilient. It is also recommended that that land be made available to smaller farms to enhance increased overall production.

Key words**:** *health status, incomes, land, productivity*

INTRODUCTION

Changes in agribusiness systems and improvements in the agricultural sector of developing countries provide opportunities for smallholder farmers to commercialize agriculture [15]. However, rapid population growth, ongoing economic meltdown and unfavourable impacts of climate change might be accountable for the possible failure of progress in the agriculture sector. Agriculture has contributed significantly to the development of Nigeria's economy by providing the necessary raw materials required by agro-based industries that form the major support of the manufacturing sector. Agricultural development is still faced by the problem of food sufficiency. The food shortage problem is indicative of the high food import bills, consistent rise in domestic food price, high annual growth rates of food demand when compared with food supply and nutritional problems among others [7]. The problem of food shortages and insecurity is exacerbated when we consider the fact that food production in Nigeria is in the hands of small scale farmers who practice mixed cropping system and cultivate between 1-2 hectares of farm land which are usually scattered over a wide area [7, 17]. In addition, the productivity of these farmers is often affected by factors such as age, cropping patterns, years of farming experience, and lack of access to credit which tend to impact negatively on productivity and efficiency.

Empirical evidence that abound in economic literature on factors that affect productivity include technology, labour employment [20], education and training of farm operators [22], agro-environmental conditions [8], security of land ownership rights [6], land, labour, fertilizer and education [4] and funding which determines the maximal physical quantity of output that can be reached as well as the number and quantity of inputs required [10] while little has been done in the area of farmers' health and how it can affect their productivity. This implies that there is room for improvement in the area of farm productivity when farmers' health is given serious attention.

Health affects agricultural systems by

affecting the health of the farm principal operators. Poor health results in loss of work days or decreases workers capacity, decrease efficiency and ability to explore diverse farming practices and by such makes farmers to capitalize on farm specific knowledge. This makes the examination of the effect of farmers' health on farm productivity very important.

MATERIALS AND METHODS

Study area

Abia State is the study area and was carved out of Imo State on the 27th of August, 1991, [1]. Abia state situates east of Imo State with which it shares common boundary on its West, North and Northeast by Anambra, Ebonyi and Enugu states respectively. The state is bounded on the East and Southeast by Cross River and Akwa Iboms States respectively while it shares its southern borders with Rivers State.

Agriculture is the major occupation of the people of Abia State [1]. This is induced by the rich soil which stretches from the north to the southern parts of the State. There are three agricultural zones in the state namely Aba, Ohafia and Umuahia. Cash crops, such as oil-palm, cocoa and rubber are produced while food crops such as yam, cassava, plantain and maize are produced in large quantities.

Data collection and analysis

A multi-stage sampling technique was adopted in collecting data for this research. The first stage involved the selection of three LGAs from each of the three agricultural zones, precisely, Ikwuano LGA from Umuahia agricultural zone, Isiala Ngwa South LGA from Aba Agricultural zone and Bende LGA from Ohafia agricultural zone. In the second stage, six (6) autonomous communities were selected from each of the LGAs making a total of eighteen (18) autonomous communities. In the third stage, three (3) villages were selected from each of the selected autonomous communities making a total of fifty-four (54) villages. In the last stage, 20 farmers were selected from each of the villages to have a total of 1080 farmers.

The Total Factor Productivity (TFP) analysis was used to estimate the productivity of the arable crop farmers in the study area while the OLS regression method was used to analyze the effects of various factors (variables) on productivity. Total Factor Productivity (TFP) estimation following [12] and [23] can be measured as the inverse of unit variable cost. This is so since TFP is the ratio of the output to the Total Variable Cost (TVC) as shown in the formula (1).

$$TFP = \frac{Y}{\Sigma P_i X_i} \quad \text{……………… ....(1)}$$

where,
Y = Value of crop in naira and
P = unit price of i^{th} variable input and
X_i = quantity of i^{th} variable input.

Total Factor Productivity ($\frac{total\ output}{total\ input}$) measured in naira …………………. ....(2)

The Ordinary Least Square regression method using diverse econometric specifications, namely, the linear, Cobb-Douglas, semi-log and the exponential functional forms analyzed. The model that gave the best fit was selected as the best equation. The model is described thus:

$$TFP = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, \text{...} \quad (3)$$

where,
Y = Total Factor Productivity
($\frac{total\ output}{total\ input}$) measured in naira
X_1 = Age of the farmers (Years)
X_2 = Farmers' education (years)
X_3 = Number of extension contacts
X_4 = Household size
X_5 = Farm size (Hectare)
X_6 = Farming experience
X_7 = Labour cost (₦)
X_8 = Capital inputs (depreciation on fixed inputs, taxes, rent, interest and insurance measured in naira)
X_9 = Fertilizer (₦)

RESULTS AND DISCUSSIONS

Farmers' average socio-economic statistics

The socioeconomic characteristics of the farmers is summarized and presented in Table 1.

Table 1. Farmers' Average Socioeconomic statistics

Variable	Mean	Std. Dev.	Min.	Max.
Age	49	12.84	23	85
Household size	4	1.73	1	8
Education	9	4.44	1	28
Experience	17	10.27	2	50
Farm size	1.28	0.79	0.2	7
Days lost	18.00	4.68	.00	35.00
Male (%)	51			
Married (%)	56			
Farmer cooperators (%)	58			
Normal Body Mass Index (%)	44			

Source: Field survey, 2016**.**

The result shows that on the average, the farmers were about 49 years of age and as such expected to be strong, agile, and active and can participate adequately in farming activities. This finding is similar to that of [21] and [2] all things being equal that age relate to healthiness, farm productivity and technical efficiency. The study showed that 51% of the respondents are males.

This concurs with studies carried out in the south-eastern region of Nigeria where majority of farm households were male-headed [11]. Furthermore, 56% of the farmers were married. [16] opined that the stability created by marriage allows for efficient use of resources. The average household size was 4 persons implying that there is likely to be little contribution of household members to farm labour supply. According to the report of [19], there is a positive and significant relationship between household size and farmers' efficiency in production. The farmers spent an average of 9 years in school. Level of education will greatly influence the decision making and adoption of innovation by farmers, which may bring about increase in productivity and efficiency in resource allocation and management. A mean 17 years of farming experience was obtained for the farmers. This may give an indication of the practical knowledge a farmer has acquired on how he can overcome certain inherent farm production problems [16], thereby increasing farm efficiency. With 58% of the respondents participating in cooperative activities, they could have enjoyed the advantage of accessibility to micro-credit, input subsidy and cross-breeding of ideas and information. The mean farm size was 1.2 hectares of land. In general, these farmers operate on a small-scale level. Only about 44% of the farmers were healthy (using BMI) and it is therefore expected that they would be efficient and productive. On the average, the farmers lost about 18 days in a farming season due to incapacitation by diseases. This is expected to have a negative effect on farm efficiency and productivity.

Productivity of arable crop farmers in Abia state

The productivity of the farmers is their ratio of total output to total inputs used in the production process. Since various arable crops were studied, the monetary approach was adopted. In this case, the ratio of the output and inputs prices was determined respectively. The result is presented in Table 2.

Table 2. Productivity of arable crop farmers in Abia State

Productivity distribution	Pooled		Healthy farmers		Non-healthy farmers	
	Freq. (f)	(%)	Freq. (f)	(%)	Freq. (f)	(%)
0.17 – 0.99	144	13	54	8	90	22
1.00 – 1.82	210	19	105	16	105	26
1.83 – 2.65	237	22	138	20	99	24
2.66 – 3.47	180	17	150	22	30	7
3.48 – 4.29	107	11	60	9	57	14
4.30 – 5.11	192	18	165	25	27	7
Total	1080	100	675	100	405	100
Minimum	0.17		0.47		0.18	
Maximum	4.43		4.43		4.09	
Mean	1.8951		2.1246		1.9018	

Source: Field survey, 2016**.**

A mean value of 1.895 implies that an average farmer made about 89 kobo for every one naira invested. For the healthy farmers, a mean productivity of 2.1246 was higher than their unhealthy counterparts (1.9018) implying that an average healthy farmer made 22 kobo more than an average unhealthy farmer for every one naira invested.

Determinants of productivity of the arable crop farmers

The determinants of the farmers' productivity were analyzed using the multiple regression model and the results are presented in Tables 3, 4 and 5 respectively. Four functional forms of the multiple regression model were tried and the exponential, semi-log and double-log forms were chosen for the pooled farmers, healthy and unhealthy farmers respectively as the lead equations. The F-ratio was statistically significant at 1% indicating a high goodness of fit of the regression line. The R^2 of 0.594, 0.458 and 0.892 showed that 59.4%, 45.8% and 89.2% changes in the productivity of the three groups were accounted for by changes in the explanatory variables included in the model while 40.6%, 54.2% and 10.8% were accounted for by error. The result shows that age of the farmers had a positive relationship with productivity at 10%, 5% and 5% for the pooled sample,

healthy and unhealthy farmers respectively implying that as age increases, productivity also increases. This finding agrees with [5, 3, 13, 23] but contradicts the findings of [9, 18, and 14].

Education was positive for the pooled sample at 10%, negative for the healthy farmers at 5% and non-significant for the unhealthy farmers. As education level increases, the pooled farmers are expected to have increased productivity.

Table 3. Pooled productivity determinants of the arable crop farmers in Abia State

Variables	Linear	Semi-log	Exponential (+)	Double-log
(Constant)	1.838 (9.392)***	.427 (3.204)**	16.301 (9.107)***	7.311 (7.991)***
Age (Years)	.003 (1.093)	.002 (.772)	.190 (1.761)*	.080 (1.128)
Education (Years)	-.006 (-.717)	.000 (.061)	.102 (1.942)*	.090 (2.315)*
Extension contacts	.010 (.242)	-.005 (-.160)	.222 (1.797)*	.093 (1.472)
Household size	.024 (1.084)	.021 (1.425)	.027 (.364)	.013 (.336)
Farm size (Hectares)	.979 (13.798)***	.527 (10.923)***	1.742 (14.686)***	.897 (14.785)***
Experience (Years)	-.011 (-2.958)**	-.014 (-5.372)***	.077 (2.352)**	-.011 (-.324)
Labour cost (₦)	-2.465E-005 (-4.667)***	-5.391E-006 (-1.500)	-.394 (-2.609)**	.001 (.018)
Depreciation (₦)	.000 (-10.449)***	-7.462E-005 (-9.379)***	-.626 (-8.268)***	-.406 (-10.507)***
Fertilizer (₦)	1.732E-005 (1.973)*	9.360E-006 (1.567)	.737 (6.089)***	-.441 (-7.130)***
R^2	0.403	0.368	0.594	0.650
Ad.R^2	0.387	0.352	0.576	0.634
F-ratio	25.990***	22.455***	35.059***	41.821***

Source: Field survey, 2016.

Extension contact was positive for the pooled sample and unhealthy farmers at 10% and 5% respectively and insignificant for healthy farmers. This is expected as extension contacts serve as a medium of advancing new ideas and technologies to the farmers. Increased extension contacts would lead to more knowledge on improved crop technologies which have a strong influence on increased productivity.

Household size was not significant for the pooled sample but negative for the healthy and unhealthy farmers at 1% and 10% significant level respectively. Farmers with large household sizes tend to dissipate most of their resources on the upbringing and education of their children [23, 18]. For every 1% increase in household size, productivity will reduce by 0.007% and 0.082% for healthy and unhealthy farmers respectively, thus for 1% increase in household size, healthy farmers are more productive than their unhealthy counterparts by 0.075%.

Farm size was positive for the pooled, healthy and unhealthy farmers at 1%, 5% and 1% significant levels respectively. This implies that the larger the farm size, the higher the level of productivity. However, unhealthy farmers had more productivity (1.18%) than the healthy farmers (0.039%) with increase a 1% increase in land size. Unhealthy farmers may practice more land-use intensification per unit area cultivated than their healthy counterparts.

Table 4. Productivity determinants for healthy arable crop farmers

Variables	Linear	Semi-log (+)	Exponential	Double-log
(Constant)	2.236 (7.801)***	.670 (4.441)***	9.327 (4.071)***	4.035 (3.905)***
Age (Years)	.003 (.716)	.002 (2.622)**	.144 (.451)	.068 (.471)
Education (Years)	-.016 (-1.467)	-.010 (-1.716)*	-.138 (-.737)	-.063 (-.753)
Extension contacts	-.089 (-1.450)	-.038 (-1.180)	.288 (1.120)	.134 (2.151)**
Household size	-.010 (-.299)	-.007 (-4.377)***	.138 (1.099)	.062 (1.090)
Farm size (Hectares)	.069 (.995)	.039 (3.025)**	.131 (1.908)*	.072 (1.105)
Experience (Years)	.004 (.574)	.003 (3.789)***	-.069 (-.425)	-.024 (-.332)
Labour cost (₦)	7.893E-006 (1.141)	.006 (1.849)*	.258 (.821)	.118 (.834)
Depreciation (₦)	.000 (-6.248)***	-.760 (-6.984)***	-.427 (-2.820)**	-.200 (-2.929)**
Fertilizer (₦)	3.604E-005 (2.537)**	.238 (3.187)**	-.739 (-2.658)**	-.341 (-2.721)**
R^2	0.518	0.458	0.652	0.464
Ad.R^2	0.185	0.226	0.489	0.204
F-ratio	6.569***	8.182***	4.012***	4.295***

Source: Field survey, 2016**.**
Significant at * = 10%, Significant at ** =5%, Significant*** = 1% $^{+}$=lead equation

Farming experience was positive for pooled and healthy farmers at 5% and 1% respectively and negative for unhealthy farmers at 10%. Increased experience have important roles to play in farming activities in that it makes farmers receptive to new ideas and as a result of that, they are expected to be more productive. The result further showed that labour cost was negative for the pooled and unhealthy farmers and positive for the healthy farmers at 5%, 10% and 5% levels of significance. This result implies that as labour cost increases, the pooled and unhealthy farmers will experience decline in productivity and otherwise for the healthy farmers. In essence, this finding does not follow *a priori* for the healthy farmers. This may be a case where the marginal productivity of labour (an increase in productivity due to additional unit of labour) exceeds the marginal cost of labour (the cost of adding an extra unit of labour).

Depreciation cost was negative for all the farmers at 1% significant level implying that as depreciation costs increase, productivity. This is expected since costs are leakages from

farmers stock of resources.

Fertilizer was positive for pooled and healthy farmers at 1% and 5% and negative for unhealthy farmers at 1% significant level. This result agrees with *a priori* for the pooled and healthy farmers and otherwise for the unhealthy farmers respectively implying that increase in the use of fertilizer will increase the productivity levels of the farmers.

Table 5. Productivity determinants for non-healthy arable crop farmers

Variables	Linear	Semi-log	Exponential	Double-log (+)
(Constant)	1.482 (4.581)***	.218 (.830)	18.996 (7.388)***	8.604 (8.320)***
Age (Years)	.013 (2.343)*	.007 (1.448)	.435 (2.015)*	.237 (2.737)**
Education (Years)	-.032 (-1.781)*	-.008 (-.564)	.171 (1.017)	.015 (.217)
Extension contacts	.248 (3.590)***	.160 (2.857)**	.480 (2.555)**	.221 (2.920)**
Household size	-.026 (-.705)	.003 (.090)	-.109 (-.933)	-.082 (-1.745)*
Farm size (Hectares)	1.238 (10.725)***	.637 (6.790)***	2.291 (13.727)***	1.118 (16.654)***
Experience (Years)	-.025 (-3.240)**	-.021 (-3.408)**	.010 (.091)	-.078 (-1.783)*
Labour cost (₦)	-1.150E-005 (-1.198)	-3.304E-007 (-.042)	-.387 (-1.878)*	-.520 (-3.241)**
Depreciation (₦)	.000 (-7.620)***	-9.513E-005 (-5.192)***	-.463 (-3.325)**	-1.410 (-7.316)***
Fertilizer (₦)	-2.962E-006 (-.211)	-1.055E-005 (-.923)	-1.286 (-6.475)***	-.574 (-7.188)***
R^2	0.618	0.480	0.832	0.892
Ad.R^2	0.591	0.443	0.811	0.879
F-ratio	22.496***	12.845***	39.165***	65.290***

Source: Field survey, 2016**.**

Significant at * = 10%, Significant at ** =5%, Significant*** = 1% $^{+}$=lead equation

CONCLUSIONS

This study analyzed the relationship between farmers' health status and their productivity levels in Abia state. A multi-stage sampling technique was adopted in collecting data for this research, thus, a total of 1080 farmers were selected. Simple descriptive statistics, the total factor productivity and ordinary least squares methods were employed in the data analysis. The result shows that on the average, the farmers were about 49 years of age, predominantly male, married with an average of 9 years of education and 17 years of farming experience with a mean farm size of 1.2 hectares. Only about 44% of the farmers were healthy (using BMI) and it is therefore expected that they would be efficient and productive. A mean productivity value of 1.895 implies that an average farmer made about 89 kobo for every one naira invested. For the healthy farmers, a mean productivity of 2.1246 was higher than their unhealthy counterparts (1.9018) implying that an average healthy farmer made 22 kobo more than an average unhealthy farmer for every one naira invested. The regression model gave an R^2 of 0.594, 0.458 and 0.892 implying that 59.4%, 45.8% and 89.2% changes in the productivity of the three groups (pooled, healthy and non-healthy farmers) were accounted for by changes in the explanatory variables included in the model while 40.6%, 54.2% and 10.8% were accounted for by error. The result shows that age of the farmers had a positive relationship with productivity at 10%, 5% and 5% for the pooled sample, healthy and unhealthy farmers respectively implying that as age increases, productivity also increases. Education was positive for the pooled sample at 10%, negative for the healthy farmers at 5% and non-significant for

the unhealthy farmers. As education level increases, the pooled farmers are expected to have increased productivity. Extension contact was positive for the pooled sample and unhealthy farmers at 10% and 5% respectively and insignificant for healthy farmers. Increased extension contacts would lead to more knowledge on improved crop technologies which have a strong influence on increased productivity. Farm size was positive for the pooled, healthy and unhealthy farmers at 1%, 5% and 1% significant levels respectively. Farming experience was positive for pooled and healthy farmers at 5% and 1% respectively and negative for unhealthy farmers at 10%. Labour cost and depreciation were negative for the pooled and unhealthy farmers and positive for the healthy farmers at 5%, 10% and 5% levels of significance.. Fertilizer was positive for pooled and healthy farmers at 1% and 5% and negative for unhealthy farmers at 1% significant level. The study showed that healthy farmers with access to appropriate inputs (including knowledge, land, tools, fertilizer, and seeds) had higher productivity and earned good incomes than non-healthy farmers, thus health improvement strategies granted to the farmers by government will allow them to thrive nutritionally, acquire more assets (including health), and become more resilient. It is also recommended that land be made available to farmers to enhance increased overall production, as well as improve the welfare of the small and landless peasantry since the bulk of agricultural food production is dominated by the small-holder farmers.

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