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Food Crop Farmers' Health and Poverty Status Nexus in Ondo State, Nigeria

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Abstract

Poverty may lead to ill-health because it forces people to live in conditions that cause sickness, as a result of indecent shelter, lack of clean water or adequate sanitation. Poor health brings loss of labour hours, loss of money and it may cause death of the farmer. This study therefore evaluated food crop farmer's health and poverty status nexus in Ondo State, Nigeria. Primary data were used and a sample of 210 farm households was drawn through a multistage sampling procedure. The data collected were analysed using descriptive statistics, Foster-Greer-Thorbecke (FGT) poverty index, quantitative method (cost of illness procedure) and probit regression analysis. The findings revealed that 88% and 44% of the respondents were married and had secondary education respectively, with a mean age of 44 years. Also, 55% of the respondents were actually poor while 19.5% of the poverty line was needed to get out of poverty. The result of probit regression model indicated that number of years spent in school, household size, farm distance, farm income, financial cost of illness and time cost of illness had significant influence on poverty level of the respondents in the study area. Therefore, government should design holistic policies that will focus on the factors highlighted above in order to alleviate poverty and improve the welfare of the food crop farmers in the study area.
Keywords: Health, poverty, farmers, illness

1. Introduction

Agriculture remains the greatest vital driver of poverty decrease and the foundation for economic progress, especially for most of the people in emerging economies. In agriculture-dominated countries, the sector produces on average 29% of the gross domestic product (GDP) and gives employment to 65% of the labour force (World Bank, 2007).

The significance of sound health is concisely explained in a popular saying, "The wealth of a nation is the health of its people." Hence, the attainment of agricultural income rests on the health of its workers. Households can use revenue from agricultural activities for enhanced access to health products and services, and agriculture makes food and nutrients available for vitality and upkeep of sound health (Asenso-Okyere *et al.* 2011).

Good health essentially affects the production capability of farmers in the agriculture sub-sector. Health enhances work effectiveness and the productivity of an individual by increasing the physical and mental capacity of people (Ulimwengu, 2009). Healthier and better nourished people are more likely to be more productive than unhealthy people (Appleton, 2000).

Agriculture and health affect each other: agriculture influences health and health influences agriculture. Prevalence of under-nutrition, over-nutrition and disease affect the demand for food quality, quantity, diversity and price, which in turn are major factors affecting agricultural productivity. Poor health brings loss of labour hours, loss of money and it may cause death of the farmer (Asenso-Okyere *et al*., 1997). All these factors make it more difficult for the households to innovate and improve their living standards.

According to Hawkes and Ruel (2006), efficiency and revenue get decreased through poor health in farming business, which further reduces farmers' capacity to tackle poor health. Also, Oshaug & Haddad (2002) pointed out that increased farm efficiency influences farm income and family nourishment, and farm income as well as family nourishment increase efficiency, which leads to good health and welfare. Poverty is capable of significantly hindering agricultural efficiency (Ulimwengu, 2009). Therefore, there is an established relationship between health and poverty through efficiency in the literature.

The problem of poverty has been a long standing issue in Nigeria (Ayoade *et al*., 2011). This is indicated by the low social status and poor living conditions of the inhabitants. The problem has been made worse over the years

by the development pattern which has favoured the urban modern sectors to the detriment of the traditional rural sectors (World Bank, 1996). Approximately 1.2 billion people in the world live in extreme poverty (Olinto *et al*., 2013). Poverty may lead to ill-health because it forces people to live in conditions that cause sickness, as a result of indecent shelter, lack of clean water or adequate sanitation. Low-income households are least able to meet (quality) health care cost.

There are studies on nexus between health status and production efficiency among farmers in Nigeria (such as Adebayo et al., 2012; Egbetokun *et al*., 2012) but there is scarcity of study that relates farmers' health and poverty status together in Nigeria. It is against this background that this study therefore evaluated food crop farmer's health and poverty status nexus in Ondo State, Nigeria. This study specifically aimed at describing the socio-economic characteristics of the respondents; identifying the types of illness being experienced by the respondents; estimating the economic burden due to illness among the respondents and examining the influence of farmer's health status and some socio-economic characteristics on farmer's poverty status in the study area. The results from this study will show the mediating factors that underpin a spiral or descent in farmer's health relating to poverty status and identify points at which intervention will most likely make a difference.

2. Methodology

2.1. Study Area

The research work was carried out in Ondo State, Southwest Nigeria. The State is on the longitudes 4° 30^{11} and 6^{11} East of the Greenwich Meridian, 5° 45^{11} and 8° 15^{11} North of the Equator. It has a land area of about 14,793 Square Kilometers (km^2) (Ondo State Government, 2016), while the population is about 3,460,877 (National Bureau of Statistics (NBS), 2011). The State is characterized by heavy rainfall with climate typical of tropics. Dry season is from November to February/March with raining season starting from March till around October. There is relatively high humidity with temperature between 21^0C and 29°C throughout the year. The annual rainfall of the State is between 1,150mm in the Northern areas and 2,000mm in the Southern areas. The State enjoys luxuriant vegetation with high forest zone (rain forest) in the south and sub-savannah forest in the northern fringe. Most of the inhabitants of the State cultivate food crops such as cocoyam, sweet potato, tomato, maize, cassava, pepper, plantain and cash crops such as cocoa as well as timber (Oseni, 2010).

2.2. Data Sources and Collection

This study used primary data collected in a cross-section survey of farm households in Ondo State. The data were obtained through the use of a well-structured questionnaire. The questionnaire was used to obtain information on the socio-economic characteristics, health related issues and poverty status of farming households in the study area. A multistage sampling procedure was used to select the respondents for this study. In the first stage, one Local Government Area was randomly selected from each of the three senatorial districts of Ondo State. The selected Local Government Areas (LGAs) are Akure North, Owo and Ile-Oluji/Oke-Igbo Local Government Areas. In the second stage, seven communities were randomly selected from each of the selected Local Government Areas (LGAs). In the third stage, simple random sampling technique was used to select ten food crop farmers (mainly maize and cassava farmers) from each of the selected communities. This was done from the list of maize and cassava farmers (for the selected LGAs) collected from Ondo State Agricultural Development Programme Office. In all, a total of 210 respondents were used for this study.

2.3. Data Analysis

The data for the study were analysed by a combination of descriptive statistics, Probit regression model, Foster-Greer-Thorbeecke poverty index and Quantitative method (cost of illness procedure). Descriptive statistics such as frequency and percentage were used to analyse the socio-economic characteristics of the respondents and various types of illnesses among the respondents. Also, cost of illness procedure was used to estimate the economic burden of diseases among the respondents. Foster-Greer-Thorbecke (FGT) Poverty Index was used to measure poverty status, while Probit Regression Model was used to examine the influence of health status and some socio-economic characteristics of the respondents on the poverty status of food crop farmers in the study area.

2.4. Model Specifications

Costs of Illness Procedure: Economic burden of diseases among households was calculated using the costs of illness procedure adopted by Sauerborn *et al.* (1996), Akinbode *et al.* (2011) and Adekunle *et al.* (2016) as follows:

Financial cost of illness

FC = $\sum_{i=0}^{n}(F_{di} + F_{fi} + F_{tri})$

Time cost of illness

T = $\sum_{i=0}^{n}(Ts_i \times as_i \times w) + (Tc_i \times ac_i \times w)$

Economic cost of illness

E = $\sum_{i=0}^{n}(F_i + T_i)$

Where:

FC = total financial cost of health care during farming season (in naira)

F_{di} = financial cost of drugs, herbs e.t.c. (in naira)

F_{fi} = financial cost of medical consultancy (in naira)

F_{tri} = financial cost of travel (in naira)

T = total time cost (days of forgone production)

Ts_i = time cost of the sick person (days of forgone production)

Tc_i = time cost of the care giver(s) (days of forgone production)

w = daily wage rate of care giver (in naira)

as_i = age coefficient of sick individual

ac_i = age coefficient of care giver(s)

The value of age coefficient 'a' was allocated based on the claims of Sauerborn *et al*. (1996) that monetary productivity of individual increases from very early twenties to about age 40 and reduces progressively later. For the purpose of this study, coefficient 'a' took on the following values:

Ages ≤ 17 years = 0.5
Ages (18 -40) = 1
Ages (41-55) = 0.75
Ages (56-65) = 0.67
Ages > 65 = 0.45

The Foster-Greer-Thorbecke (FGT) Poverty Index: It was used to measure poverty status among the respondents. The FGT poverty index is given by:

$$P_\alpha(y,z) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^\alpha \qquad (1)$$

Where:

n = total number of respondents i.e. farm households sampled
q = the number of respondents below the poverty line i.e. poor people
Z = the poverty line for the household
y_i = per capita household income of the i^{th} respondent
α = non-negative poverty aversion parameter and takes on value 0, 1 or 2
$\left(\frac{z-y_i}{z}\right)$ = proportion shortfall in income below the poverty line.

Determining the poverty index:
When α = 0 in FGT, the expression becomes:

$$P_0 = \left(\frac{q}{n}\right) \qquad (2)$$

This is called the incidence of poverty or headcount index, which measures the proportion of the population that is poor i.e. falls below the poverty line.
When α = 1 in FGT, the expression becomes:

$$P_1 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{Z - y_i}{Z}\right)^1 \quad (3)$$

This is called Poverty depth or Poverty gap index, which measures the extent to which individuals fall below the poverty line as a proportion of the poverty line.
When α = 2 in FGT, the expression becomes:

$$P_2 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{Z - y_i}{Z}\right)^2 \quad (4)$$

This is called Poverty severity, which measures how severe poverty is among the respondents.
Construction of Poverty Line: Respondents were categorised into poor and non-poor groups. The two-third mean per-capita income was used as the benchmark, which was adopted from the studies carried out by Ruben & Van den Berg (2001), Yunez-Naude & Taylor (2001) and Igbalajobi *et al*. (2013). Households whose mean per-capita income fall below the poverty line were regarded as being poor while those whose per-capita income were above the benchmark were regarded as non-poor.

$$\text{Per capita income (PCI)} = \frac{Income}{Household\ size} \quad (5)$$

$$\text{Total Per capita Income (TPCI)} = \text{Summation of PCI} \quad (6)$$

$$\text{Mean TPCI (MTPCI)} = \frac{TPCI}{Total\ number\ of\ households} \quad (7)$$

$$\text{Poverty Line (PL)} = \frac{2}{3} \times MTPCI \quad (8)$$

Probit Regression Model: This model was used to examine the influence of health status and some socio-economic characteristics on the poverty status of food crop farmers in the study area. Households were classified as poor and non-poor based on the estimation of the poverty line. This dummy variable (1 = non-poor, 0 = poor) was then used as dependent variable for the regression analysis to estimate the coefficient of factors that affect farmers poverty status.
The Probit model to be estimated is given as:

$$P\left(Y_1 = \frac{1}{x_i}\right) = \frac{exp(x_i\beta)}{1 + exp(x_i\beta)} \quad (9)$$

An equivalent form can be stated thus:

$$\frac{exp\,(x_i b)}{1 + exp\,(x_i b)} = \frac{1}{1 + exp(x_i b)} \quad (10)$$

This can be expressed as $q_{it} = bX_{it} + e_{it}$
Where;
q_{it} = an unobservable latent variable for poor households.
b_{it}= vector of parameters to be estimated
e_{it}= error term
The observed binary (1, 0) for whether household is poor or otherwise is assumed in the usual Probit model. The probability that the binary assumes the value 1 implies

$$\text{Prob}\,(q_n = 1) = \frac{e^{x_n} + \beta^{x_n}}{1 + e^{x_n} + \beta^{x_n}} \quad (11)$$

Thus, in this study, the explanatory variables included in the model are:
X_1 = Age of farmer (in years)
X_2 = Gender (1=Male, 0 otherwise)
X_3 = Financial cost of illness (Naira)
X_4 = Time cost of illness (Naira)
X_5 = Farm size (in hectares)
X_6 = Distance from home to farm (in km)
X_7 = Years spent in school

X_8 = Farm Income (in naira)

X_9 = Non − farm income (in naira)

X_{10} = Household size

3. Results and Discussion

3.1. Socio-economic Characteristics of Respondents

The socio-economic characteristics of the respondents are likely to have a direct or indirect relationship with their poverty status, health and their decision making process. As shown on Table 1, as much as 62% of the household heads sampled were older than 40 years, with an average age of 44 years. This indicates that majority of the respondents were getting older and this may cause degenerated health condition and subsequent decline in productivity, which may in turn lead to poverty. This supports the findings of Kussa (2012) who reported that the average age of the respondents was 48 years. About 88% of the respondents were married, which implies that most of the respondents had family responsibilities, to cater for the wellbeing of their households. The outcome of this study confirms the findings of Igbalajobi *et al.* (2013) which stated that more than 86% of rural farmers were married in the study area. Majority (about 59%) of the respondents had at least secondary education. This implies that majority of the farming household heads were literate and it implies that they will embrace and accept innovations. It can therefore be deduced that this may reduce the incidence of illness and subsequently alleviate poverty in the study area.

Household size has been seen as one of the major determinants of poverty (for instance Igbalajobi *et al.,* 2013). The mean household size was 6 persons per house and the majority of the respondents (70%) fall between 5 and 10 persons per house. These results imply that there may be availability of family labour for majority of the respondents. The farmers can therefore make use of family labour in order to minimize costs expended on labour so as to maximize profit. This result agrees with Ezeibe *et al*. (2015) who reported that majority of the sampled farmers had family size of between 6 and 10. Majority (51%) of the households had farms whose sizes are less than 2 hectares while the remaining 49% had farms ranging from 2-4 hectares. The implication of this is that all the respondents were smallholder farmers with reference to the grouping made by Ojuekaiye (2002) where it is stated that farmers with between 0.1 and 5.9 hectares of land are smallholders. This study supports Oparinde (2017) who explained that majority of cassava and maize farmers were smallholders. About 1% of the respondents had their farm right at the back of their residential building. This indicated that majority of the respondents were small-scale farmers, a fact which is likely to contribute to the incidence of poverty in these households.

Table 1: Socio-economic Characteristics of Respondents

Characteristics	Frequency	Percentage (%)
Age (years)	**Mean =44**	
21-40	80	38.1
41-60	130	61.9
Marital Status		
Married	184	87.6
Widowed	22	10.4
Divorced	2	1.0
Separated	2	1.0
Educational Level		
Primary	86	41.0
Secondary	92	43.8
Tertiary	32	15.2
Household size	**Mean=6 Persons**	
<5	63	30.0
5-10	147	70.0
Farm Size (ha)		
<2	107	51.0
2-4	103	49.0
Total	**210**	**100.0**

Source: Field Survey, 2016

3.2. Incidence of Diseases among Farming Households

Different ailments were observed in the sampled farm families in the study area and diverse types of treatment were required by each household. Table 2 shows the type of sicknesses faced by the households and the types of action sought by the families. Among the sampled households, 21% and 42.9% had diarrhoea and malaria respectively, 28.6% had common cold while 9% had Stomach upset. The results show that 20% of the households were not suffering from any observable illness. The incidence of Malaria with the highest frequency may be attributed to high humidity which supports the plenty, existence and spread of mosquitoes in the study area. This result is a confirmation of the outcome of a study by Adebayo *et al.* (2012) where it is reported that about 80% of the respondents were attacked by malaria in the study area.

As shown on Table 2, 21.4% of the households sought medical attention and used prescribed drugs, 49.5% of the sampled farm household took drugs without consulting a doctor or pharmacist while 28.6% took herbal medication. This implies that majority of the respondents did not patronize health care services where drugs can be prescribed for the treatment of their illness. This could be as a result of lack of money to access health care services that probably seems expensive to them. Adebayo *et al*. (2012) reported that majority of the sampled farmers took drugs without consulting medical practitioners.

Table 2: Distribution of farm households according to the types of illness suffered

Parameter	**Frequency**	**Percentage**
Type of Illness		
None	42	20.0
Common cold	60	28.6
Diarrhoea	44	21.0
Malaria	90	42.9
Stomach upset	19	9.0
Type of Treatment		
None	42	20
Self-medication	104	49.5
Drugs by Prescription	45	21.4
Use of Herbal Medication	60	28.6
Total		**100**

Source: Field Survey, 2016
Multiple Responses Exist.

3.3 Poverty Line

This study employed income approach method to set the poverty line i.e. the poverty line was drawn based on total income of the households. From the survey data, the value of poverty line computed was USD456.6 per annum. Thus, farming households that earned less than the value of poverty line were considered poor, while those that earned greater than or equal to the value of poverty line were considered to be non-poor.

3.4 Analysis of Farm Household Poverty Status

The farm households poverty status in the state were analysed using the three indicators: incidence of poverty (P_0), poverty depth (P_1) and severity of poverty (P_2). Incidence of poverty indicates the percentage of the households that falls below the poverty line; poverty depth shows the amount by which the poor fall short of the poverty line and severity of poverty is the sum of the square of poverty depth divided by the number of poor households in the sample.

Table 3 shows that the incidence of poverty (P_0) in this study was 0.550 indicating that 55.0% of the sampled farming households were actually poor based on the poverty line. The percentage of the poor gotten from this study is similar to Iheke & Nwaru (2013) who reported that about 52% of the sampled non-adopters of innovations were poor. Yusuf *et al*. (2015) reported that about 44% of the sampled farmers in Nasarawa State were poor, Ibrahim & Umar (2008) reported similar result which states that 53% of the respondents were poor.

The value P_1 (poverty depth) among the rural farming households was 0.195, implying that an average poor farming household would require 19.5% of the poverty line (456.6 USD) to get out of poverty. The value P_2 P_2

was 0.054, indicating that the severity of poverty of the poor farming households was 5.4%. These results are similar to Oguniyi *et al.* (2011) who reported poverty depth of 18% among sampled farmers that practised mixed farming and 5.3% poverty severity among food crop farmers in the study area.

Table 3: Poverty Indices among Farm Households in the Study Area

Poverty Indices	Study Area
P_0	0.550
P_1	0.195
P_2	0.054

Source: Field Survey, 2016

3.4. Effects of Farmers' Health and Socio-economic Characteristics on Farmers' Poverty Status

Probit regression model was used to analyse the determinants of poverty status among the farming households in Ondo State, Nigeria. The likelihood ratio statistics as indicated by χ^2 statistics (21.42) are highly statistically significant (P < 0.0183), suggesting the model has a strong explanatory power. The Pseudo R^2 value of 0.1557 implied that the independent variables explained 16% of changes in the dependent variable.

The results of the analysis as shown in Table 4 revealed that number of years spent in school, household size, farm distance, farm income, financial cost and time cost of illness had significant influence on poverty status of the respondents in the study area. The positive relationship between number of years spent in school and poverty status indicates that number of years spent in school increases the probability of being non-poor. This implies that there would be increase in the household's chance of moving out of poverty as level of education increases. Iheke & Nwaru (2013) and Igbalojobi *et al.* (2013) reported that the higher the level of education acquired by the household, the better the likelihood of being non-poor. Also, increase in household size would be bring about increase in the probability of being poor. Etim *et al*. (2011) explained that increase in household size would make the household to have problem in meeting up with basic household needs such as good nutrition and shelter, which may increase level of poverty if not adequately provided. A unit increase in farm distance would increase the probability of being poor in the study area. Also, any increase in the value of financial cost and time cost of illness would bring about increase in the likelihood of the respondents being poor. This is due to the fact that reduction in efficiency, subsequent reduction income and money loss to treatment as a result of ill health (Adebayo *et al.,* 2012) would bring about increase in poverty level of the farmers. Rhaji & Rhaji (2008) reported that health related indices had negative relationship with revenue generation and productivity among sampled household farmers. This implies that health is a very important determinant of farmers' poverty status in the study area.

Table 4: Probit Results on the Determinants of Poverty Status among Farming Households in the Study Area

Explanatory Variables	Coefficient	Z	P>/Z/
Sex	0 .2735	0.79	0.428
Age	-0.0235	-0.84	0.402
School years	0.0879**	2.02	0.043
Household size	-0.0974***	-3.20	0.000
Farm size	-0.1224	-0.45	0.650
Farm distance	-0.9163**	-2.54	0.011
Farm income	6.17e-07***	4.32	0.000
Non-farm income	1.31e-06	1.32	0.188
Financial cost	-1.71e-05**	-2.51	0.011
Time cost	-9.41e-05**	-2.01	0.049
Constant	-3.2842**	-2.22	0.026

Loglikelihood = -58.102715; LR Chi^2 (10) = 21.42; Prob>Chi^2 = 0.0183; Pseudo R^2 = 0.1557
*** means 1% level of significance; ** means 5% level of significance; * means 10% level of significance
Source: Field Survey, 2016.

4. Conclusion and Recommendations

This study revealed that majority of the rural farming households in the study area were poor. In general, the

health of the farmers had significant relationship with the poverty status of the households in the study area. Thus, it implies that it is very important to give emphasis on the quality of the health system as it has significant impacts on the poverty status of farm households.

Based on the findings of the study, it is recommended that:

- There should be provision of health care services and improvement of the existing ones via construction of more health care facilities and good maintenance culture as well as provision of drugs to farmers. This is expected to reduce the economic cost of illness and increase productivity which subsequently reduce level of poverty among the farmers.
- There should be more awareness creation about the need to patronize qualified medical personnel and health facilities instead of using self-medication measures among farmers.
- Apart from farming, households should engage in other activities which can help increase income and improve their standard of living. Therefore, diversifying to these activities could assist in the achievement of the goal of poverty reduction in the economy. Policy makers should look for means of improving these activities and make good policies that will promote them without having negative effects on farming.
- Household heads should try and control the household size, which could be through the use of modern family planning techniques. This however requires visiting the health centres around them for proper advice.
- Government, NGOs and development agencies should promote access to formal education by the people, which could be through free education and award of scholarships. This would help the people to acquire skills needed for the activities that would improve their standard of living and reduce their poverty level.

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