INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Economic Impact of Malaria Shock on Farm Productivity in Lagos State, Nigeria

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Abstract:
Malaria, is not only a health issue but also an economic problem. At the household level, affects productivity of the people and their assets acquisition capacity. Malaria therefore, has a direct impact on household income, wealth, labour productivity and labour market participation of both sick and care givers. As much as 13 percent of total small farming household expenditure in Nigeria is currently being used in treating malaria while many are simply too poor to pay for adequate prevention and treatment of the disease. The broad objective of this study is to analyse the economic impact of malaria health shock and farm productivity in Lagos state. The main source of data was a primary data sourced through structured questionnaire that was administered on 150 respondents with only 128 questionnaires returned. The data was anaylsed using descriptive statistics, regression analysis and stochastic frontier production function. The result of the analysis revealed that the number of illness episodes (β= .333, t = 4.525, p<.05), financial cost of subsistence (β= .227, t = 2.855, p<.05) and financial cost of drugs and herbs (β= .333, t = 4.525, p<.05) have a significant positive effect on financial costs of health of farmers. It was also revealed that household size (β= -.389, t = -56.614, p<.05), gender (β= -.983, t = -.983, p<.05), total days of malaria incapacitation (β= -1.218, t = 17.065, p<.05) and Total income lost due to malaria in naira (β= -1.243, t = -1.243p<.05) have a significant negative impact on the age of farmers. The Table also revealed that the size of the farm. (β= .1353, t= -17.034, p<.05), educational status (β= .0183, t= 14.213, p<.05) and. No of days lost due to malaria incapacitation (β= .055, t= 83.019, p<.05) have a significant positive impact on the age of farmers. The study also found that occupation (β= .000, t = 3.000, p<.05), marital status (β= .607, t = 46.470, p<.05), household size (β= 1.060, t = 75.488, p<.05), educational status (β= 140, t = 13.677, p<.05), and farming output (β=.560, t = 67.840, p<.05), have a significant positive impact on the age of house head farmers. Finally, it was revealed thatcost of labour use (β= .007, t = .073, p>.05) and inefficiency (β= -.169, t = -.064, p>.05) do not have a significant effect on food production efficiency level of farmers. The study then concluded that malaria health shock has a significant negative impact on farm productivity in Lagos State. This corroborate the position that farmer are the most vulnerable to malaria sometimes because they do not have enough money, or sometimes because they do not have health care services in the rural areas and thus recommended that Nigerian government need to provide accessible health facilities to the rural dwellers who are mainly into farming and there is a need to carry out a regular malaria prevention sensitization programmes for the farmers

Keywords: *Economic impact, malaria shocks, farm productivity, stochastic frontier production function and economic cost of illness*

1. Introduction

Diseases significantly reduce the productivity of agricultural labour in developing countries due to the loss of labour and technical knowledge of productive adults (World Bank, 2008). In Nigeria about 70% of the working population is in the agricultural sector which are mostly in the rural areas and one of the most important sectors contributing to GDP (Otedola and Efumnu, 2013, CIA, 2012). The sector is prone to health hazards such as malaria, HIV/AIDS, etc. resulting in loss of farm productivity.

World Health Organization asserted that the single disease of malaria reduces the gross national product of countries in sub-Saharan Africa by more than 1%, rising to as much as 2-6% in Kenya or 1-5% in Nigeria Premature death and spells of illness form infectious disease cut down tomorrow's and today labour force. It is no wonder, then that the re-emergency of certain infectious disease brings not only a shudder to the body of the victim, but also to the body politic, and the body economic, of a nation.

Dauda (2002) stated that farmer is the most vulnerable to malaria sometimes because they do not have money, or sometimes because they do not have health care services in the rural areas. One of the major input variables to agricultural productivity in West and Central Africa is human labour. Most of these people are exposed to endemic malaria in this part of the world, and much of that labour time is either lost or rendered more inefficient due to incident either from the individual themselves or within their family, which directly affect agricultural productivity (Keatinge, 2002). The two immediate impacts of an illness and death are the loss of an often-productive person and loss of time as family members take off from agricultural work to care for the sick, and to mourn. Expenses for medicine and funerals add to a family's debt burden and eat into its capital that could otherwise be invested in agriculture.

Loss of labour affects crops and livestock production, by reducing the amount of land under cultivation. Soil fertility and harvests decline because soil management, tilling, weeding, mulching, and planting are neglected frequent loss and sale of animals due to less care lead in turn to less long-term capital being available for instrument.

Malaria are often not prevalent at harvest time, and havoc with the work force (CTA, 2002). This loss of labour has been the primary focus of the aggregate studies of malaria (Nur, 1993 and Goodman, et al, 1999). The output effect of the lost time depends both on the degree to which other family member can increase work effort and in malaria episodes and harvest period (Najera et al, 1998).

Agricultural productivity can be defined as the marginal efficiency level attained per unit of labour supplied for specific task (Okoruwa and Agulana, 2003). Evidence has shown that there is some indicator that malaria have some adverse effects on labour productivity of farmer (Brohult et al 1981). However, the direction of causality of economic effect of malaria may not necessarily be through uncultivated arable land, sick labour only but also through lost capital and purchasing power.

Empirical evidences abound in literature on the relationship between health shocks and farm productivity (Wahab and Oni, 2015, Munongo and Chitungo, 2013). Malaria, is not only a health problem, it is also an economic problem. Malaria at the household level affects productivity of the people and their assets acquisition capacity. Households also frequently spend substantial share of their income and time on malaria prevention and treatment as well as an effort to control mosquitoes (Coluzzi, 1999). The cost of prevention and treatments consumes scarce crop farmer's resources. Also, as some household members spend their productive time caring for those under malaria attack, they themselves in turn seek rescue from the onslaught of the disease (Mills, 1998). Malaria therefore has a direct impact on households' income, wealth, labour productivity and labour market participation of both the sick and the caregivers. In terms of resource loss, households spend between \$2 and \$25 on malaria treatment and between \$20 and \$15 on prevention each month (Mills, 1998). As much as 13 percent of total small farming household's expenditure in Nigeria is currently being used in treating malaria, while many are simply too poor to pay for adequate prevention and treatment of the disease (WHO, 2011). The loss to households may however be greater with the current trend in malaria resistance to traditional first-line drugs. Such loss has serious implication for poor household who are already malnourished, who live under pitiable condition and who constitute over 65 percent of the nation's population. Calculating the loss of productivity or productive potential resulting from sickness involves the application of some consensual economic principles.

The economic impact of malaria extends beyond the direct impact on labour productivity. A high malaria burden is likely to increase labour turnover, resulting in increased hiring and training costs and reduced profitability for enterprise. Furthermore, a high malaria incidence within a particular area may reduce tourism, deter otherwise foreign and domestic investment, and prevent the use of land or other natural resources (WHO, 2001).

It has been observed that the most significant loss associated with malaria is borne directly by affected households through productivity losses (Alaba and Olumuyiwa 2006; Asante, Asenso-Okyere, and Kusi 2005; Russell 2003; Chima et al. 2003; Asenso-Okyere and Dzator 1997). Malaria is more common in rural farm communities, and transmission generally coincides with the planting and harvesting seasons and so may affect area cultivated and area harvested (Sauerborn et al. 1991; Endah and Ndambi 2006; Chuma, Thide, and Molyneux 2006). Invariably, malaria induces changes in planting patterns to minimize the overlap between malaria episodes and peak agricultural work. According to Chuma et al. (2006), "having high levels of malaria during the farming season has important negative implications for wellbeing over time." Two studies in Sri Lanka also indicated that most of the days lost to malaria were concentrated in the rainy season when agricultural activities were at their peak (Konradsen et al. 1997; Attanayake et al. 2000).Leighton and Foster (1993) also observed that the total value of production loss in Kenya was higher in the agricultural sector than the industrial and service sectors. In Kenya, the agricultural sector accounted for 57 percent of the total value of production loss, compared with 35 percent and 8 percent for the service and industrial sectors, respectively. In measuring the economic cost of malaria to households in a rural community in Sri Lanka, Konrandsen et al. (1997) estimated that the annual economic loss amounted to US\$15.56 per household, a figure equivalent to 6 percent of the net annual household income. The implication for agricultural production was that the malaria cases were found to be concentrated in the agricultural season and that during this season 5.6 percent of working days were lost to malaria sickness.

1.2. Objective(s) of the Study

The major aim of this study is to assess the economic impact of malaria shock on farm productivity in Lagos State and specifically,

- Identify the effect of socioeconomic variables on the episodes of malaria among farmers in the study area
- Determine cost of illness, results of the days loss by farmers due to malaria illness in the study area
- Examine the impact of malaria incidence on economic efficiency of farmers in the study area

2. Methodology

2.1. Description of the Study Area

The study was carried out in Epe Division Area of Lagos State. It has 3 development councils, with a tropical climate marked with dry and rainy seasons. It is characterised by high rainfall and low temperature during the raining season that often lasts for about 7 months (April -October). The dry season period is characterised by high temperature and very erratic low rainfall and it lasts for about 5 months (November – March). The major occupation in the area is farming. They engage in fish farming and cultivation of crops like cassava, maize, rice etc.

2.2. Sources of Data

Primary data was employed for this study and the data were collected through structured questionnaire administered to rural farmers and personal interviews. Data on socio-economic characteristics and vulnerability of household was collected. Simple random sampling techniques was employed for the research survey. About 150 respondents was randomly selected but only 128 respondents were eventually used for the analysis of the objectives of the study.

A combination of three analytical tools was used for this study. These are Descriptive Statistical Analysis, Regression Analysis, and Stochastic Frontier Production Function.

2.2.1. Descriptive Analysis

The descriptive analysis involved the use of relative frequency distributions. Measures of central tendency and percentages.

Cost of illness: the expenditures due to malaria episodes was analyzed using the cost of illness procedure following Sauerborn et al (1996) as follows

2.2.1.1. Financial Cost of Illness

F = $\sum_{i=0}^{N}(F_{dt} + F_{ti} + F_{tr} + F_{li})$

Where:

F = Total financial costs of health (in naira)

F_{dt}=Financial cost of drugs and herbs (in naira)

Fil = Financial cost of medical consultancy (in Naira)

F_{li} = Financial cost of subsistence (in Naira)

N = number of illness episodes

2.2.1.2. Economic Cost of Illness

E = $\sum(Fi + Ti)$

Where:

Following Idris (2015), the economic cost of illness (COI) to be adopted for this study is

E = $\sum(Fi + Ti + Pc)$

E = Economic cost of illness

Fi = Total financial cost of health (in naira)

Ti = Total time cost (days of forgone)

Pc = Prevention cost

Ordinary least square (OLS): in the regression analysis, the total farming output of the respondents in (N) Naira represents the regression (Y).

Y = f(x1, x2, x3, x4, x5, x6, x7, x8, x9, x10) where

Y = Farming output (kg)

X1=Age of the farmers (years)

X2 = Household size

X3 = Gender

X4 = Farm size in hectares

X5 = Farming experiences (years)

X6 = Education attainment

X7 = Total days of malaria incapacitation / yr

X8 = No of days lost due to malaria incapacitation

X9 = Total income lost due to malaria in naira

X10 = Cost of treatment / yr

2.3. Determinants of Vulnerability

The determinants of vulnerability were analyzed by using Ordinary Least Square (OLS) regression analysis. Many variables were initially suggested but some of them were collinear with some other variables. The analysis was done using the Backward Linear Regression option of SPSS 20.0 Statistical Package, which enable the redundant and problem variables to be dropped. At the final analysis, the estimated model is given as:

where:

G_1= age of house head

G_2 = primary occupation dummy (farming alone = 1,0 otherwise)
G_3 = marital status dummy (married = 1,0 otherwise)
G_4 = household size
G_5 = years of schooling
G_6 = distance of public health center (km)
G_7 = farm income (N'000)
ei = stochastic error term

2.4. Food Production Efficiency Model

The stochastic FRONTIER 4.1 developed by Coelli (1994) is one of the available and most widely used statistical packages for efficiency analysis. The package was used to estimate the Maximum Likelihood Estimates (MLE) and coefficients of the socio-economic determinants of inefficiency for the incidence. The general models that was estimated was stated as:

$$Log GM_i = \beta_0 + \beta_1 Log\ LA_1 + \beta_2\ Log\ FLC_i + \beta_3\ Log\ HLC_i + \beta_4\ Log\ FTC_i + \beta_5\ Log\ SDC_i + (vi-ui) \quad ...... \quad 5$$

Vi – N(0, σ^2v) where:
Log = logarithm.
GM_i = Gross margin of *i*th farmer estimated as total revenues from output minus total variable cost.
LA_i = Land area of *i*th farmers (hectares)
FLC_i= Cost of family labour *i*th farmer (N)
HLC_i= Cost of hired labour of *i*th farmer (N)
FTC_i= Cost of fertilizer of *i*th farmer (N)
SDC_i= Cost of seed of *i*th farmer (N)
v_i = symmetry error
u_i = inefficiency
The inefficiency model can be stated as follows:
$|u_i| = ø_0 + ά_I$
Where:
$|u_i|$ = inefficiency of i*th* farmer
M_1 = sex of house head (male = 1,0 otherwise)
M_2 = farming experience (years)
M_3 = malaria status (positive = 1,0 otherwise)
M_4 = Total sick days in the cropping season
M_5 = Total farm days lost due to sickness in the cropping season
M_6 = Total market days lost due to sickness in the cropping season
M_7 = Intensification index as measured by Ruthenburg (1980) {computed as total land was cultivated in the past six years divided by number of season (12)}
M_8 = Use of mulching (yes = 1,0 otherwise)
M_9 = Use of crop rotation (yes = 1,0 otherwise)
M_{10} = Use of organic manure (yes = 1,0 otherwise)
M_{11} = Use of zero tillage (yes = 1,0 otherwise)
M_{12} = Use of cover crops (yes = 1,0 otherwise)
M_{13} = Distance of main agricultural market (km)
M_{14} = Diversification index computed from the Herfindal index is computed as:
*100 with ci being the total income from the ith crop
G_4 and G_5 are as defined in equation 4.
d_i = error term

2.5. Descriptive Analysis

The descriptive analysis covers the demographic variables, financial cost of illness, economic cost of illness, determinants of vulnerability and food production efficiency variables

Age	**Frequency**	**Percent**
15-20years	16	12.5
21-25years	32	25.0
26-30	16	12.5
31-35years	**48**	**37.5**
36years and above	16	12.5
Total	128	100.0
Gender		
Male	96	75.0
Female	32	25.0
Total	128	100.0
Marital status		
Married	48	37.5

Age	Frequency	Percent
Single	80	62.5
Total	128	100.0
Educational status		
Primary	32	25.0
Secondary	48	37.5
NCE	16	12.5
B.Sc. (Ed)	16	12.5
Others	16	12.5
Total	128	100.0
House location		
Close to the bush	71	55.5
River side	21	16.4
Others	36	28.1
Total	128	100.0
How do you dispose of the human excreta		
in the bush	48	37.5
in nearby stream	16	12.5
use bucket system	16	12.5
use open ditch	16	12.5
use pit-hole latrine	16	12.5
use water	16	12.5
Total	128	100.0
What is the average income in a month from your secondary occupation		
0-10,000	64	50.0
2-40,000	32	25.0
41, 000 and above	32	25.0
Total	128	100.0
How many times do you witness Malaria attack in a month		
None	48	37.5
Once	64	50.0
Twice	16	12.5
Total	128	100.0
how many days for you to recover fully from malaria treatment		
0-1	32	25.0
2-4	48	37.5
5 and above	48	37.5
Total	128	100.0
What is the average income lost in a month when you are down with malaria attack		
0-1,000	16	12.5
2-4,000	48	37.5
4, 100 and above	64	50.0
Total	128	100.0
The average number of times your household members are down with malaria in a month		
0-1	32	25.0
2-4	80	62.5
5 and above	16	12.5
Total	128	100.0
What type of treatment do you seek, you are down with malaria		
Clinic/hospital	32	25.0
Herbal	64	50.0
Self-medication	16	12.5
Others	16	12.5
Total	128	100.0
What is the average cost of treating malaria in a month		
0-1,000	48	37.5
2-4,000	64	50.0
4, 100 and above	16	12.5
Total	128	100.0

Table 1: Descriptive Statistics
Source: Field Survey, 2019 (SPSS Output, Version 20.0)

The result in Table 1 indicates that most of the farmers sampled in the study are aged between thirty one and thirty five years (37.5%) of which they are male by gender (75.0%), single by marital status (62.5%) with secondary school education (37.5%) living in location close to the bush (55.5%) who disposes their human excreta in the bush

(37.5%). The distance of the house of this category of respondents to the place where they disposes their human excreta is between one and three meters, get their drinking water from stream or river (25.0%), have between none and one male child (50.0) and between none and one female child (37.5%) as well as between none and one dependent living with them (62.5%). The farm size of most of these farmers is between two and four acres (50.0%) of the types of crops they planted is banana or cassava (25.0%), used mainly family labour on their farm (62.5%), harvesting and selling their produce between two and four times in a year (50.0%) with the average income per harvest ranging between twenty thousand and forty thousand Naira, engaging in carpentry as a secondary occupation (25.0%), earning an average income ranging between zero to ten thousand Naira from the occupation.

This category of Farmers witness malaria attack once in a month (50.0%), recovering from the treatment between two and four days or five days and above (25.0%), loosing between two and four thousand Naira income on the average to malaria attack (37.5%), the household members get down with malaria between two and four times in a month (62.5%), seeking the herbal treatment when down with malaria (50.0%), spending an average cost ranging between two and four thousand Naira in a month on the treatment (50.0%), with the cost of treatment either borne alone or by others (50.0%), with the cost been borne by either siblings, mother/father, relatives, friends or others (12.5%). Most of the respondents have use preventive measures against malaria infection (75.0%), with the type of preventive method being Herbal weekly of which the health officers visit their area once or not at all, of which they are either aware or unaware about modern preventive and control measures of malaria infection (50.0%) with monthly expenditure on food being between twenty and forty thousand naira (50.0%) while monthly expenditure on non-food being between twenty and forty thousand naira (50.0%) with their current harvest for the season being fifty thousand and above (50.0%) while their current harvest for other crops being fifty thousand and above (50.0%)

2.6. Financial Cost of Illness

The result of the estimation of the financial cost of illness model where total financial costs of health was the dependent variable while financial cost of drugs and herbs, financial cost of medical consultancy, financial cost of subsistence and number of illness episodes were the explanatory variables is presented in Table 2 as follows:

Variables	Beta	T	P	R	R^2	F	P
(Constant)	.439	1.979	.050	.662[a]	.439	24.023	.000[b]
How many times do you witness Malaria attack in a month	.333	4.525	.000				
What is the average cost of treating malaria in a month	.333	4.525	.000				
What is your average income per harvest	.227	2.855	.005				
What type of treatment do you seek, you are down with malaria	.093	1.377	.171				

Table 2: Financial Cost of Illness Model Estimates
Source: Field Survey, 2019 (SPSS Output, Version 20.0)

Table 2 above revealed that the number of illness episodes (β= .333, t = 4.525, p<.05), financial cost of subsistence (β= .227, t = 2.855, p<.05) and financial cost of drugs and herbs (β= .333, t = 4.525, p<.05) have a significant positive effect on financial costs of health of farmers. The Table also revealed that financial cost of medical consultancy (β= -.529, t = -9.872, p<.05) does not have a significant effect on financial costs of health of farmers. The result also showed that the explanatory variables accounted for 43.9% variation in the dependent variable (R^2=.439).

2.7. Economic Cost of Illness

The result of the estimation of the economic cost of illness model where farming output (kg) was the dependent variable while age of the farmers, household size, gender, farm size in hectares, education attainment, total days of malaria incapacitation, no of days lost due to malaria incapacitation, total income lost due to malaria in naira, cost of treatment were the explanatory variables is presented in Table 3 as follows

Variables	Beta	T	P	R	R^2	F	P
(Constant)	4.909	10.804	.000	.820[a]	.7100	75.000	.000[b]
Household_size	-.389	-56.614	.000				
Gender	-.983	-12.543	.000				
What is the size of your farm	.1353	-17.034	.000				
Educational status	.0183	14.213	.000				
How many times do you witness Malaria attack in a month	-1.218	17.065	.000				
What is the average income lost in a month when you are down with malaria attack	-1.243	5.1345	.000				
how many days for you to recover fully from malaria attack	.055	83.019	.000				

Table 3: Economic Cost of Illness Model Estimates
a. Dependent Variable: Age
Source: Field Survey, 2019 (SPSS Output, Version 20.0)

Table 3 above revealed that household size (β= -.389, t = -56.614, p<.05), gender (β= -.983, t = -.983, p<.05), total days of malaria incapacitation(β= -1.218, t = 17.065, p<.05) and Total income lost due to malaria in naira(β= -1.243, t = -1.243p<.05) have a significant negative impact on the age of farmers. The Table also revealed that the size of the farm. (β= .1353, t= -17.034, p<.05), Educational status (β= .0183, t= 14.213, p<.05) and. No of days lost due to malaria incapacitation (β= .055, t= 83.019, p<.05) have a significant positive impact on the age of farmers. The result also showed that the explanatory variables accounted for 71.0% variation in the dependent variable (R^2=.7100) implying that the explanatory variables explained the variations in the dependent variable adequately.

2.8. Determinants of Vulnerability

The result of the estimation of the determinants of vulnerabilitymodel where age of house headwas the dependent variable whileprimary occupation dummy (farming alone = 1,0 otherwise), marital status dummy (married = 1,0 otherwise), household size and farm income were the explanatory variables is presented in Table 4 as follows

Variables	Beta	T	P	R	R^2	F	P
(Constant)	-8.333	-61.785	0	.610[a]	0.53	49	.000[b]
Occupation	0	3	0				
Marital status	0.607	46.47	0				
Household_size	1.06	75.488	0				
Educational status	0.14	13.677	0				
Farming_output	0.56	67.84	0				

Table 4: Determinants of Vulnerability Model Estimates
a. Dependent Variable: Age
Source: Field Survey, 2019 (SPSS Output, Version 20.0)

Table 4 above revealed that occupation (β= .000, t = 3.000, p<.05), marital status (β= .607, t = 46.470, p<.05), household size (β= 1.060, t = 75.488, p<.05), educational status (β= 140, t = 13.677, p<.05), and farming output (β=.560, t = 67.840, p<.05), have a significant positive impact on the age of house head farmers. The result also showed that the explanatory variables accounted for 53.0% variation in the dependent variable (R^2=.530) implying that the explanatory variables explained the variations in the dependent variable adequately.

2.9. Food Production Efficiency Model

The result of the estimation of the food production efficiency model where Gross margin of *i*th farmer estimated as total revenues from output minus total variable cost was the dependent variable whileland area of *i*th farmers (hectares), Cost of family labour *i*th farmer, Cost of hired labour of *i*th farmer, Cost of fertilizer of *i*th farmer, Cost of seed of *i*th farmer (N) and inefficiency (gender, malaria status, sick days) were the explanatory variables is presented in Table 5 as follows

Variables	Beta	T	P	R	R^2	F	P
(Constant)	8.01	14.845	0				
What type of labour do you use on your farm	0.007	0.073	0.942				
inefficiency	-0.169	-1.874	0.064				
What is your expenditure on non-food items	0.563	7.208	0	.586[a]	0.343	18.795	.000[b]

Table 5: Food Production Efficiency Model Estimates
Source: Field Survey, 2019 (Spss Output, Version 20.0)

Table 5 above having excluded land area of farmers, cost of fertilizer of and cost of seed of farmer revealed that cost of labour use (β= .007, t = .073, p>.05) and inefficiency (β= -.169, t = -.064, p>.05) do not have a significant effect on food production efficiency level of farmers. The Table also revealed that expenditure on non-food items (β= .563, t= 7.208, p<.05) have a significant positive effect on food production efficiency level of farmers. The result also showed that the explanatory variables accounted for 34.3% variation in the dependent variable (R^2=.343).

3. Discussion of Findings

The empirical result revealed that the number of illness episodes (β= .333, t = 4.525, p<.05), financial cost of subsistence (β= .227, t = 2.855, p<.05) and financial cost of drugs and herbs (β= .333, t = 4.525, p<.05) have a significant positive effect on financial costs of health of farmers. It was also revealed that household size (β= -.389, t = -56.614, p<.05), gender (β= -.983, t = -.983, p<.05), total days of malaria incapacitation (β= -1.218, t = 17.065, p<.05) and Total income lost due to malaria in naira(β= -1.243, t = -1.243p<.05) have a significant negative impact on the age of farmers. The Table also revealed that the size of the farm. (β= .1353, t= -17.034, p<.05), educational status (β= .0183, t= 14.213, p<.05) and. No of days lost due to malaria incapacitation (β= .055, t= 83.019, p<.05) have a significant positive impact on the age of farmers. The study also found that occupation (β= .000, t = 3.000, p<.05), marital status (β= .607, t = 46.470, p<.05), household size (β= 1.060, t = 75.488, p<.05), educational status (β= 140, t = 13.677, p<.05), and farming output (β=.560, t = 67.840, p<.05), have a significant positive impact on the age of house head farmers. Finally, it was revealed thatcost of labour use

(β= .007, t = .073, p>.05) and inefficiency (β= -.169, t = -.064, p>.05) do not have a significant effect on food production efficiency level of farmers.

The implication of this result is that malaria health shock has a significant negative impact on farm productivity in Lagos State. This result corroborates the findings of Leighton and Foster (1993) who observed that the total value of production loss in Kenya was higher in the agricultural sector than the industrial and service sectors. In Kenya, the agricultural sector accounted for 57 percent of the total value of production loss, compared with 35 percent and 8 percent for the service and industrial sectors, respectively. The result was also in line with the study of Konrandsen*et al.* (1997) who estimated that the annual economic loss amounted to US$15.56 per household, a figure equivalent to 6 percent of the net annual household income. The implication for agricultural production was that the malaria cases were found to be concentrated in the agricultural season and that during this season 5.6 percent of working days were lost to malaria sickness

4. Conclusion

The study concluded that malaria health shock has a significant negative impact on farm productivity in Lagos State. This corroborate the position that farmer is the most vulnerable to malaria sometimes because they do not have money, or sometimes because they do not have health care services in the rural areas. One of the major input variables to agricultural productivity in West and Central Africa is human labour. Most of these people are exposed to endemic malaria in this part of the world, and much of that labour time is either lost or rendered more inefficient due to incident either from the individual themselves or within their family, which directly affect agricultural productivity.

4.1. Recommendation

The following suggestions are offered:

- Nigerian government need to provide accessible health facilities to the rural dwellers who are mainly into farming
- There is a need to carry out a regular malaria prevention sensitization programmes for the farmers

The cost of accessing health facilities in the rural area should be minimal such that the farmers can afford such services.

5. Acknowledgements

We wish to acknowledge Tertiary Education Trust Fund (TET fund) for Sponsoring this Institution Based Research for year 2018 and the Management of Michael Otedola College of Primary Education, Noforija EPE (MOCPED) under the Leadership of DR. ONIBON, N.O for the Opportunity given to us to showcase this research work.

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