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EFFECT OF MALARIA INCIDENCE ON MAIZE FARMING HOUSEHOLDS' PRODUCTIVITY IN IDAH LOCAL GOVERNMENT AREA, KOGI STATE, NIGERIA

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ABSTRACT
The study examined the effect of malaria incidence on farming households` maize productivity in Idah Local Government Area of Kogi State, Nigeria. Primary data was used to achieve the research objectives. A multi-stage random sampling technique was used in selecting 120 respondents. Structured questionnaire was used to collect the required data. Data obtained were analyzed using descriptive statistics, Ordinary least square regressions. Results from the findings showed that 77.5% of the respondents were male with a mean age of 50 years. The respondents had a mean household size of 9 members and 47.50% of the respondents have access to credit facilities. The results showed that bushes (77.5%), house close to river (45.83%), work when it is sunny (45.83), house close to stagnant water (40.0%) were the factors responsible for malaria incidence. Headache (92.5%), body pain (89.17%), tiredness (82.50%), heat (81.67%), coldness (67.5%) were the common malaria symptoms among the farming households in the study area. OLS multiple regression showed that day's incapacitation (β=-254.1) and frequency of malaria illness were significant (β=-1214.2) both statistically significant at 1%. The study concluded that malaria incidence had significant effect on maize productivity in the study area. The study recommends that farmers should be encouraged to keep their surrounding clean in order to avoid breeding of mosquitoes. Medication that can reduce the days of incapacitation should be made available to farmers at affordable prices in order to improve the quality of life and farmers' productivity.

Keywords: Malaria Incidence, Productivity, Maize Farmers, Kogi State, Nigeria.

INTRODUCTION
Good health and productive agriculture are important in the economy of a country especially in the fight against poverty. Health enhances work effectiveness and the productivity of an individual through increase in physical and mental capacities (Ajani and Ugwu, 2008). Ugwu (2006) opined that health capital is affected by a number of preventable diseases such as malaria, musculoskeletal disorders, HIV/AIDS, injuries, yellow fever, typhoid fever, schistosomiasis, onchocerciasis, diarrhea just to mention a few. World Bank (2007) observed that illness and death from HIV/AIDS, malaria, tuberculosis and other diseases reduce agricultural productivity through loss of labour and death of productive adults. Similarly, Olatunji *et al.* (2013*)* reported that the productivity of farmers is affected by a number of occupational hazards and health problems such as malaria, musculoskeletal disorders, farm injuries, yellow fever, diarrhea, respiratory diseases and skin disorder. In sub-Saharan Africa (SSA), malaria is the most common ailment in the group of communicable diseases constituting a problem to public health and the performance of African economies (WHO, 2012), and it is known to significantly increase poverty and poor economic growth (Gallup and Sachs, 2001). Malaria is a major public health problem in Nigeria. It remains an important cause of morbidity

and mortality. Nigeria accounted for 32% of the global estimate of 655,000 malaria deaths in 2010 (WHO, 2012). An estimated 97% of the country's approximate population of 160 million residents are at risk of malaria. Children under age 5 and pregnant women are the groups most vulnerable to illness and death from malaria infection in Nigeria. It accounts for about 60% of all outpatient attendance and 30% of all hospital admissions, seven (7) out of every 10 patients seen in Nigeria hospitals are ill of malaria (FMoH, 2005; 2007).

Malaria is a health problem that results from mosquito. Malaria remains one of the most severe health problems and major public health problem in Nigeria (Ibrahim *et al*., 2017). According to Alaba and Alaba (2009), malaria is one of the greatest threats facing development in Africa today. In 2006, more than 90 percent of deaths from malaria occurred in Africa, where 45 of the 53 countries are endemic for the disease (WHO, 2012). Malaria cost African continent more than $12 billion and may also be largely responsible for slow economic growth in African countries, which may account for as much as 1.3% per year (WHO, 2010). Malaria cause morbidity disability or death: and all three effects have direct indirect costs that can affect labour availability and productivity and ultimately, economic development. The issue of malaria is becoming alarming in Nigeria, especially in the communities with environments that are not well kept. According to Caraballo and King (2014), malaria is transmitted through the bite of the female anopheles mosquito. These mosquitoes most commonly bite between dusk and dawn. The anopheles' mosquito is the vector of the malaria parasite, carrying the parasite from one person to another.

Malaria and Agriculture are intimately related, Oladepo *et al.* (2010) found that Agricultural practices such as the use of irrigation during the cultivation, the use of ponds for fish farming and the storage of water tanks for livestock provide suitable breeding grounds for anopheles mosquito, which could be of disadvantage to farmers because of the risk of malaria infection. Malaria affects farmers` productivity. This is because a sick farmer cannot go to farm to work or abandon their farm activities (Fanello and Baker, 2010). According to Oguniyi *et al*., (2015) malaria is not only a health problem, it is also an economic problem as it affects household income, productivity and their assets acquisition capacity. Farmers' financial resources are expended on treatment of malaria and prevention of the vector as well as its parasite. As Nigerians attempt to boost the output of the agricultural sector, reduce poverty and reduce food insecurity, knowledge of the magnitude of the economic burden of malaria on the agricultural sector will be helpful in determining the priority that should be accorded by government to malaria control in the rural areas where majority of the farmers reside.

In the developing world, especially Africa malaria is the disease that has the most spread impacts on growth and development among the farming population (WHO, 2013). In the most heavily affected regions, malaria accounts for 40% of public health spending (Purdy *et al*., 2013). Equally important are the indirect costs of seeking healthcare and taking care of children and others who are infected with malaria and the relationship of the indirect costs to the farm labour supply and productivity. Malaria exerts a huge social and economic burdens on families, communities and the country at large with an estimated annual loss of about 123 billion Naira in payments and prevention as well as hours not worked (Jimoh *et al*., 2007; Usman and Adebayo, 2011). The loss to households may however be greater with the current trend in malaria resistance to traditional first-line drugs. Such loss according to Oguniyi *et al*. (2015) has serious implication for poor household who are already malnourished, who live under pitiable condition and who constitute over 65% of the nation's population. The malaria disease will affect the physical and intellectual capacity of the farming house-hold with fever, headaches and other physical symptoms household suffer due to scarce medical service, thereby affecting finances for maize farming.

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Kogi State and Idah local government area in particular possibly has its fair contributions in the malaria cases in Nigeria as Idah local government also possess a terrain; that is: rivers, bushes around farms e.tc that support the breeding of mosquitoes and this may have implication on the output of maize production. Existing empirical investigations on the effect of malaria incidence on farmers output generally were done outside this study area. A study of this nature will assist the government on possible policy areas that can help in malaria eradication so as to achieve sustainability in the agricultural sector. Finding from this study will benefit scholars in the field of health economics and other relevant stakeholders in making informed decisions. The broad objective of the study as to determine the effect of malaria incidence on maize output in Idah local government area of Kogi State, Nigeria. The specific objectives were to: describe the socio-economic characteristics of maize farmers in the study area; identify the various factors responsible for malaria incidence; identify the various symptoms of malaria incidence; and determine the effect of malaria incidence on maize productivity in the study area.

MATERIALS AND METHODS

The Study Area

The study was carried out in Idah Local Government Area of Kogi State, Nigeria. It lies on the eastern bank of the river Niger at 7º0 5' 00"N 6º45'00"E 17.08333ºN 6.75000ºE. The town is one of the major food suppliers of Kogi State. It has commercial routes in the river Niger linking Lokoja, the Kogi State Capital, to the south, Agenebode Edo State cross the Niger to the West, its population is primarily Igala. Idah hosts a Federal Polytechnic. It also hosts the college of science, health and technology.

Sampling Techniques

The data for this study was collected from maize farmers in Idah Local Government Area through a 3-stage sampling technique. The population of the study comprised of the entire maize farmers in Idah Local Government Area of Kogi State, Nigeria. three-stage random sampling techniques was used for the study. First stage, involve the random selection of two wards from the L.G.A. (Idah). In stage two, from each of the ward, 4 farming communities were selected giving a total of 8 farming communities. Stage three, 15 maize farmers (respondents) were randomly selected from each of the farming communities making a total of 120 respondents.

Data Collection

Primary data was used for this study. The primary data was obtained from maize farmers in Idah Local Government Area of Kogi State using a structured questionnaire. 120 copies of questionnaire were administered to the 120 maize farmers selected from the communities.

Method of Data Analysis

Data for this study was analyzed using both descriptive and inferential statistics. The study used descriptive statistics such as; frequency distribution, mean, mode and percentage and ranking. It also used inferential statistics such as; OLS regression. The explicit form of the model is as specified below:

$Y = B_o + B_1X_1 + B_2X_2 + \ldots B_iX_i + u_t$

where;

Y=Maize Productivity (Kg/ha),

B_o = Intercept

B = Slope

X_1 = Days incapacitation (days)

X_2 = Cost of malaria incidence (₦)
X_3 = Frequency of malaria illness (number of times)
X_4 = Transportation cost for treatment (₦)

RESULTS AND DISCUSSION

Socio-economic Characteristics of Maize Farmers

Results in Table 1 shows that most (58.3%) of the respondents had their age ranged of 41-60 years, 22.5% had age ranged of 21-40 years while 19.2% had 61-80 years. The average age of the farmers in the study area was 50 years. The mean age of 50 years implies that, the maize farmers were still young and within active labour force group and can cope with vigorous activities of maize farming. The result indicate that greater proportions of the respondents (77.5%) were males while (22.5%) were females. This means that most of the farming households were headed by males, and have the potential to work for longer hours on the farm than their women. The high percentage of male farmers in the state is expected because farming in Nigeria is done manually by the rural farmers. Results in Table 1 indicates that majority (72.5%) of the respondents in the study area were married, 12.5% were divorced, 3.3% were single while 5.83% were widow and widower each.

Results in Table 1 further shows that a significant number of the respondents completed their secondary education (39.7%), (33.33%) had primary education, (10.0%) attained tertiary education and (17.50%) of the respondents had no formal education respectively. The results shows that majority (63.3%) of the respondents travelled between 1-5 kilometers to get to health care centre while 36.7% travelled 6-10 kilometers. The average distance was 4.8 kilometers. Results in Table 1 shows that only 18.33% of the farmers in the study area belong to farming association while majority (80.83%) do not belong. Results in Table 1 shows that 37.5% of the respondents had farming experience of 16-30 years, 36.7% had 1-15 years, and 15.8% had 31-45 years. The mean framing experience was 20 years, which shows that the farmers were quite experienced. The distribution of farmers according to farm size shows that majority (89.2%) of the farmers had farm size of 1-5 hectares while 10.8% had 6-10 hectares. The mean farm size was 3.5 hectares. The results also shows that 47.5% of the farmers have access to credit while 52.5% do not have access. This implies that majority of the farmers in the study area do not have access to credit. 62.5% of the respondents had 1-10 household size while 37.5% had 11-20 household size. The average household size was 9 persons. Results in Table 1 also shows that 50.8% of the farmers earned less than ₦50,000 annually, 25.8% earned between ₦50,001-100,000 while 23.4% earned above ₦100,000. The mean annual income was ₦43,750.12k. Results on the frequency of malaria illness per year revealed that 42.5% of the farmers fell sick of malaria more than three times in a year, 28.3% three times, 19.2% two times while 10.0% once in a year. Degree of falling sick of malaria also talk much about farming household welfare as frequent malaria sickness affect the household income. This agrees with the findings of Alaba and Alaba (2002) who reported that malaria attacks an individual on average of four times in a year with an average of 10 to 14 days of incapacitation. This shows how terrible malaria is to the well-being of farmers as they cannot work or command any economic value during those days.

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Table 1: Socio-economic Characteristics of Maize Farmers (n = 120)

Socio-economics characteristics	Frequency	Percentage	Mean/Mode
Age			
21-40	27	22.5	
41-60	70	58.3	50 years
61-80	23	19.2	
Sex			
Male	93	77.5	Male
Female	27	22.5	
Marital status			
Single	4	3.33	
Married	87	72.50	Married
Divorce	15	12.50	
Widow	7	5.83	
Widower	7	5.83	
Level of education			
No formal education	21	17.50	
Primary education	40	33.33	
Secondary education	47	39.17	Secondary education
Tertiary education	12	10.00	
Distance to health care centres (Km)			
1-5	76	63.3	4.8km
6-10	44	36.7	
Farming association			
Yes	22	18.33	
No	97	80.83	No
Farming experience			
1-15	44	36.7	
16-30	45	37.5	20 years
31-45	19	15.8	
46 and above	12	10.0	
Farm size			
1-5	107	89.2	
5-10	13	10.8	3.5 Ha
Access to credit			
Yes	51	47.50	
No	63	52.50	No
Household size			
1-10	75	62.5	9 persons
11-20	45	37.5	
Annual income			
Less than 50,000	61	50.8	
50,001 – 100,000	31	25.8	₦43, 750.12k
Above 100,000	28	23.4	
Frequency of malaria illness per year			
Once	12	10.0	
Twice	23	19.2	
Three times	34	28.3	
More than three times	51	42.5	

Source: Field Survey, 2019

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Factors Responsible for Malaria Incidence

The distribution of respondents according to the various factors responsible for malaria incidence in the study area is presented in Table 2. Results in Table 2 shows that house close to bushes (77.5%), house close to river (45.83%), work when it is sunny on the farm (45.83%) and house close to a stagnant water (40.0%) were the major factors responsible for malaria incidence in the study area. However, house close to the stream (19.17%), house close to the pond (19.17%) and house close to lake (19.17%) were other factors responsible for malaria incidence in the study area. This is because many people in the rural area do not consider sanitary condition of their surroundings as a matter of importance. A lot of people in the rural area live in compounds surrounded by bush and in other places the surrounding is also water logged. The poor environmental sanitation in some rural areas exposes many people to many diseases causing agents. It provides a suitable environment for the breeding of mosquitoes which cause malaria among others. This is why malaria is one of the diseases with the highest number of reported cases in the rural health centers especially in Nigeria. This collaborates Nicky (2010) who reported that mosquitoes breed in water logged and bushy areas capable of bringing malaria.

Table 2: Various Factors Responsible for Malaria Incidence

Factors	Frequency*	Percentage
House/hut close to the stream	23	19.17
House/hut close to open & blocked drainage	55	45.83
House/hut close to open & free drainage	23	19.17
House/hut close to the pond	23	19.17
House/hut close to a stagnant water	48	40.00
House/hut close to bushes	93	77.50
Work when it is sunny on the farm	55	45.83

*Multiple response
Source: Field Survey, 2019

Symptoms of Malaria Incidence

The distribution of respondents according to the various symptoms of malaria incidence among farming households in the study area is presented in Table 3. Respondents were asked about the various symptoms that a person with malaria presents. They indicated awareness of common symptoms as shown in Table 4.3. The most frequently mentioned symptoms of malaria included headache (92.5%), body pain (89.17%), tiredness (82.50%), heat (81.67%) and coldness (67.5%). However, some respondents also mentioned shivering (59.17%) and dizziness (28.33%) as symptoms of malaria illness. Malaria has become a menace in Africa, especially in rural areas because of low level of awareness and use of modern preventive measures against mosquitoes that causes malaria. Malaria is the main cause of morbidity and mortality in Nigeria because the environment favors the multiplication and sustenance of the parasite causing the disease. Finding of this study agrees with Mboera *et al*. (2013) when they reported that agricultural activities increase exposure of individuals to mosquito bites which could lead to malaria transmission.

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Table 3: Various Symptoms of Malaria Incidence

Symptoms	Frequency*	Percentage
Feel body pain when having malaria	107	89.17
Feel cold when having malaria	81	67.50
Feel heat when having malaria	98	81.67
Feel shivering when having malaria	71	59.17
Feel tired when having malaria	99	82.50
Feel dizzy when having malaria	34	28.33
Have head ache when having malaria	111	92.50

*Multiple response
Source: Field Survey, 2019

Effect of Malaria Incidence on Maize Output of the respondents

The regression results of the effect of malaria incidence on maize output in the study area is presented in Table 4. From the regression estimates, the output of the model showed an R square value of 0.457 which implies that 46% of the effect of malaria incidence on maize output in the study area was explained by the independent variables. F value of 24.20 which was significant at 1% indicates the significance of the entire model. However, it should be noted that since R^2 is 46%, there are other factors which have effects on maize output. The other factors accounted for the remaining 54%. Out of the four independent variables included in the model, two had significant influence on maize output. Days incapacitation and frequency of malaria illness were negatively signed and significant each at 1% level. The coefficient of days of incapacitation was negatively signed and significant at 1%. The inverse relationship implies that maize output increases with decrease in the days of incapacitation due to malaria illness by the farming households. This is in consonance with Ochi *et al*. (2015) that workdays lost to presumptive malaria therefore constitutes an important poverty dimension that cannot be ignored. This is because the labour productivity as a result of the malaria problem will be affected. The coefficient of frequency of malaria illness was negatively signed and significant at 1%. This implies that maize output increases with a decrease in the number of times a farmer had malaria illness in the study area. This implying that as households reduced workdays lost to the frequency of malaria incidence, this will reduce the probability of households' labour productivity on maize farming. The result of the study agrees Ashley *et al.* (2018), with malaria affects about 200 million people undermining their productivity at household, national and international scales. It is known that human health plays a key role in determining productivity at both household and country scales (Kumar and Kober, 2012). Diseases like malaria which undermine human health and wellbeing often reduce productivity of those affected directly and indirectly (Mustafa and Babiker, 2007; Rogerson *et al.*, 2018). Due to the severity of malaria, once someone is affected, they always seek treatment and sometimes a break from work (Asenso-Okyere *et al.*, 2011) which is a significant concern for agricultural productivity. Absence from work results in loss of significant proportion of income or earnings (Girardin *et al.*, 2004).

Table 4: Regression results of the effect of malaria incidence on maize output

Variables	Coefficients	Std. error	t	p|z|
Constant	9675.595	695.0548	13.92	0.000
Days incapacitation	-254.0661	60.08594	-4.23	0.000
Cost of malaria treatment	-0.0691336	0.0801583	-0.86	0.390
Frequency of malaria illness	-1214.234	341.7596	-3.55	0.001
Transportation cost for treatment	0.1518235	0.1859674	0.82	0.416
Number of Obs.	120			
F – value	24.20			
Prob > F	0.000			
R^2 value	0.457			
Adjusted R^2 value	0.438			

Source: Computed Field, 2019

CONCLUSION AND RECOMMENDATIONS

Nigeria is known for high prevalence of malaria and it is a leading cause of morbidity and mortality in the country. Available records showed that over 50 percent of the population of Nigeria with Kogi State inclusive, suffers from at least one episode of malaria each year. The findings of the study showed some of the factors responsible for malaria incidence in the study area include living homes closeness to bush, house close to river and house close to stagnant water. Headache, body pain, tiredness, heat and coldness were the most frequently mentioned symptoms of malaria among farmers in the study area. The effect of malaria incidence on maize productivity was influenced by days of incapacitation and frequency of malaria illness. Breeding of mosquitoes due to bushy surrounding contribute to malaria, loss of capital due to malaria treatment and wasted days due to malaria were perceived effect of malaria incidence on maize productivity. Based on findings of this study, the following recommendations were made: Government and relevant stakeholders should enforce and maintain a law that will encourage sanitation to discourage the breeding of mosquito. Medication that can reduce the days of incapacitation should be intensified and made available to farmers at affordable prices in order to improve the quality of life and productivity of farmers.

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