



Malaria Incidence and Crop Productivity among Farming Households in Kabba/Bunnu Area of Kogi State, Nigeria

**Aderonke Bashirat MOHAMMED^{1*} Matthew Olaniyi ADEWUMI²
Olugbenga Ayodeji MOKUOLU³**

¹Kabba College of Agriculture, Ahmadu Bello University, Kabba, Kogi State, Nigeria
(orcid.org/0000-0002-1118-9385)

²Department of Agricultural Economics and Farm Management, University of Ilorin, Nigeria
(orcid.org/0000-0002-6382-0618)

³Department of Paediatrics and Child Health, College of Health Sciences, University of Ilorin, Nigeria
(orcid.org/0000-0001-8273-5876)

*e-mail: bashraj25@yahoo.co.uk

Alındığı tarih (Received): 30.06.2017

Online Baskı tarihi (Printed Online): 09.07.2018

Kabul tarihi (Accepted): 19.06.2018

Yazılı baskı tarihi (Printed): 29.08.2018

Abstract: The study was based on an assessment of malaria incidence and crop productivity in Kabba/Bunu Local Government Area of Kogi State. The socio economic characteristic of households, cropping pattern, incidence of malaria and the input and output characteristics of the farming household were examined. Data were collected through the use of structured questionnaires from 72 households selected randomly in twelve villages across the local government area were monitored for eight month from May to December 2012 Households were classified based on malaria incidences as low, moderate and high respectively. Descriptive statistics and Analysis of Variance (Anova) were used for data analysis. Results show that majority of household heads (93%) were males and practiced intercropping. High malaria incidence was observed among 75% of household members during the study period. The study established a great variation in the output of crops produced among household and in the use of family labour, seed, land and fertilizer input. Crop output was higher for low malaria mobility households. It is therefore recommended that appropriate mechanism should be put in place in alleviating malaria incidence in the study area.

Keywords: Anova, crop productivity, incidence, malaria and rapid diagnostic test (RDT)

1. Introduction

Agriculture belongs to the real sector of Nigerian economy. It is described by a large number of small scale farmers scattered over simple home stead frameworks, low capitalization and low yield per hectare. This type of farming stays noteworthy in the Nigerian economy regardless of the vital significance of the oil sector. Agriculture provides employment to Nigerians teeming population, eradicates poverty and contributes to the growth of the economy (Izuchukwu, 2011). The agricultural sector from 2009 till date assumes the first position as at independence. Agriculture currently contributes about 38.4% to Nigeria gross domestic product (NBS, 2015).

Crop production remains the major drivers of the sector as it accounts for 91.97% of the overall

nominal growth of the sector (GDP Report Q3,2017).

Nigerian agriculture is dominated by the small scale farmers who provide the greater part of nourishment in the nation. Despite their exceptional and crucial position, the small holder farmers belong to the poorest fragment of the populace and hence, can't contribute much to their farms. The endless loop of destitution among these farmers has led to the unremarkable performance of the sector. The sort of farming practiced in Nigeria is for the most part rain sustained, labour escalated and less external input intensive.

Furthermore, due to over reliance on labor, the wellbeing of every worker is critical in enhancing and additionally sustaining agricultural production The issues undermining crop production still persist showing that some different element still

should be investigated and tended to for legitimate focused on approach and well-targeted policy.

Medical issue has been observed to impact negatively on agricultural productivity in Nigeria and malaria has been a contributor to ill health in Africa (Breman et. al, 2006). Annihilation of the scourge of malaria and other life undermining ailments are some of the worries of the government. The importance of lessening malaria fever is additionally typified in the Millennium Development Programmes (MDPs).

There are various channels by which malaria obstruct development including effect on populace development, savings and investment, worker's productivity, untimely mortality and medical expenses (Sachs and Malaney, 2010). Conversely, agriculture is an asset which contributes to good health, nutrition and resilience. At the point when both health and agriculture flourish, a fortifying cycle of wellbeing can come about, yet when either endures, the cycle ends up noticeably one of lowered agricultural productivity and lowered wellbeing. Agricultural development and practice can intensify the rate of infection through an interaction with disease vectors and parasites.

When disease besets farmers, their productivity is lessened, which may spur poverty. Beyond the immediate effects of loss of man-days, disease undermines long haul agricultural productivity in various ways: when sickness prompts long haul debilitation, households may react through withdrawal of reserve funds, the sales of important assets (for example, materials, jewelry, cultivate hardware, and land), withdrawing children from school, or lessening the nutritious value of their food consumption. These reactions can adversely affect the long haul labour productivity of household members.

A greater percentage of small scale farmers in Nigeria leave in the rural areas. A typical rural village in the country is characterized with indecent environment, poor housing, bushy surroundings, exposed surface water in wells and gutters. These aforementioned are reproducing grounds for mosquitoes that in turn inject malaria parasites on the rural people. With underdeveloped social and health infrastructures especially health

clinics as cushions, the incidence of malaria becomes high in rural areas (Mohammed et al., 2015).

Malaria morbidity therefore will affect the level of labour availability as infected individuals may not have the capability of attending to their farmsteads and even if they do, labour inefficiency may result. It is worthy of note that no study has been carried out to ascertain the frequency of malaria by monitoring farmers in a longitudinal manner and carry out medically certified test to ascertain in reality the occurrence of malaria in the study area in the light of this, this study seeks to examine the direct link of malaria incidence as it affects crop productivity in the study area. The specific objectives are to examine the socio economic characteristics of farming households, examine the incidence of malaria in the study area and compare crop productivity among households based on malaria incidence.

2. Methodology

This study was carried out in Kabba/Bunu Local Government Area of Kogi State. Kabba – Bunu is a Local Government in Kogi State and it falls within the guinea savannah zone. The Local Government Area is located in the western part of the state which falls between latitude 7⁰N and 31⁰N of the equator and longitude 5⁰ 41'E and 6⁰ 15'E, with a projected population figure of 201,153 as at 2017.

The study area is known to have a tropical savannah climate with distinct rainy and dry season. The rainy season range from the Month of April to October while the dry season is between November and March. The annual temperature varies between 27⁰C and 33⁰C with relative humidity between 30% and 40% in January and rises between 70% and 80% in July to August.

Malaria transmission, based on climatic parameters occurred between (May and October). About six months of rainy season are responsible for malaria transmission in the area. The soil in the area is predominantly sandy loam in texture.

The indigenes are farmers engaging in crop production, rearing of livestock and fish. Kabba-Bunnu is blessed with suitable ecological and

climatic conditions which make it possible to produce various agricultural products such as yam, cassava, cocoyam, maize, millet, rice guinea corn, palm produce, cowpea and others (Anonymous, 2017).

Data for the study were collected through the administration of well structure questionnaire monitored for a period of eight month (May to December, 2012). The structured questionnaires were designed to seek information on the socio-economic information of household heads, malaria occurrences in the households as well as information on farming household's inputs and output. The primary data were elicited between the months of May to December. Malaria testing was carried out and documented vis a vis other independent variables that were used for the study. In other to document the incidence of malaria in the study area a base line malaria test was done on all the selected farmers upon enrollment into the study group. A weekly visit was made to the farmers' household by the health workers. Activities amid the visit included a review of family members and their health status; identifying the event of fever within the previous week and carrying out a malaria parasite test upon any individual from the family member with fever or history of fever within the preceding week. Following results of the malaria test, the number of days' households couldn't take care of their farmsteads was documented.

Test for malaria parasite were carried out on the individuals from selected household using a Rapid Diagnostic Test Kit (RDT) based upon the identification of *Plasmodium Falciparum* *Histidine rich protein ii antigen*. This is an exceptionally basic and simple test to deploy that and is currently recommended by the World Health Organization for the community level testing for malaria parasite (WHO, 2006). A two stage sampling technique was abducted in selecting sample for this study. In the first stage 12 villages were randomly chosen from the local government area. The second stage involved a random selection of six farming households from each selected village. Consequently, a total of 72 households were used for the study. The data collected were

analyzed using descriptive statistics and analysis of variance (ANOVA).

Descriptive Statistics

Descriptive statistics such as tables, percentage, mean, frequencies and standard deviation were utilized to depict the socio economic characteristics of household heads, cropping pattern as well as the input and yield attributes of the farming households in the study area.

Analysis of Variance (ANOVA) Parametric Test

Parametric tests are used to analyze whether input and output are similar for various categories of malaria incidence households. For this study farming household were categorized into low malaria incidence, moderate malaria incidence and high malaria incidence respectively based on the proportion of household members with malaria. Household with less than 20% incidence or episodes of malaria were categorized as low while households with greater than 20% but less than 50% were categorized as moderate and those with above 50% malaria incidence were categorized as high. This study compares means among the different categories of malaria morbidity households. Parametric tests for comparing means assume that the variables are normally distributed. In this study f-test are used to compare the means of input utilized for crop productivity and average yield per hectare among household's categories. The effects of malaria incidence on inputs and outputs were analyzed using analysis of variance procedure and the model is specified as follows:

$$Y_{ij} = U + \alpha_i + e_{ij}$$

Where:

Y = Crop Output (grain equivalent weight)

U = Overall mean

α_i = Input Variable (i = Land, Labor, Seed, Fertilizer, Chemical)

e_{ij} = Random error

The expression of outputs and planting material in grain equivalent weight (GEW) was to Standardize the heterogeneous outputs and planting materials quantities in crops by multiplying them with given conversion factors

based on grain values of the crop (Seaman and Yeyer, 1978).

3. Results and Discussion

Table 1 presents the socioeconomic characteristics of the household heads in the study area. Majority of household heads (93%) were males. The mean age of the household heads was

54 years with above half (55.6%) of the household heads within the age group of 41– 60 years. The maximum age of respondents was 72 years and the minimum age of 30 years. The more active and virile age groupings of 21 – 40 were relatively low. The mean household size for farming household was 6 persons while the minimum and maximum were 2 and 16 persons in a household respectively.

Table 1. Distribution of household heads according to their socio-economic characteristics in the study area

Characteristics	Frequency (N=72)	%
Gender of Household head		
Male	67	93.1
Female	5	6.9
Marital Status		
Married	67	93.1
Widow	5	6.9
Level of Education		
Non formal Education	20	27.8
Primary Education	20	27.8
Secondary Education	14	19.4
Adult education	4	5.6
Tertiary education	14	19.4
Age (Years)		
21-30	1	1.4
31-40	12	16.7
41-50	18	25.0
51-60	22	30.6
>60	19	26.4
Mean	54	
Household Size (person)		
<5	25	34.7
5-10	44	61.1
11-15	1	1.4
>15	2	2.8
Mean	6	

Source: Field survey, 2012.

Most of the household heads are educated with about 44% having post primary education while 27.8% had no formal education.

From the result of the socio-economic characteristics of household on Table 1, it can be deduced that more than half (57%) of the household heads in the study area could be said to be tending towards old age. This could have a negative effect on their performance in terms of farm operations; this is in line with the findings of Aheisibwe (2008) that beyond a certain age people become excessively frail, making it impossible to engage in agricultural production. Most of household heads are educated and would be able to comprehend extension guide. On the result of

household size, it is believed that the larger the number of people in the household, the more the labour available for farming.

3.1. Description of Cropping Pattern

The households in the study area practice both mono-cropping and inter-cropping with twelve different crops identified and had an average of 3 plots. Table 2 shows the distribution of households according to the type of crops cultivated. 80% of the households cultivated cassava, 40.28% cultivated maize while only 16.67% planted yam as sole crop. Yam was intercropped with cassava by 40.28% and with pepper by 37.50% of the households. Maize and cassava were intercropped

by (31.49%) and with sorghum by (20.83%) of the households respectively. The commonest form of intercropping in the area are yam/cassava, yam/pepper and maize/cassava respectively while about 20% of the farming households intercropped maize/sorghum.

Table 2. Cropping patterns of farming households

Crops	Frequency	%
Maize	29	40.28
Cassava	57	79.17
Yam	12	16.67
Yam/Pepper	27	37.50
Maize/Cassava	23	31.94
Yam/Cassava	29	40.28
Maize/Sorghum	15	20.83
Others	10	13.88

Source: Field survey, 2012.

3.2. Households Composition and Malaria Episodes

Table 3 presents malaria occurrence in the study area. Malaria episode among children was highest with 22.45% in October, followed by 19.89% in May. The lowest malaria episodes were recorded in different months for the different household categories; 2.25% for children in September, 5.49% for adult male and 5.6% for adult females in December respectively. In October 19.78% of male had malaria The highest malaria episodes for female adult member of the household were recorded in May with about 16.9% having malaria and October with about 22.5% of the female household members with malaria. Malaria episode was highest in October for all the categories of households in the study area in all malaria affected at least three-quarter of the households. About 324 out of 432 members. This will have its consequences on the input and output of farming households.

3.3. Comparing input and output of households

In order to compare the input and output of households malaria affected households were categorized into three based on the proportion of households with malaria viz: high, moderate and low malaria incidence respectively.

Majority of the household 73.6% had high malaria incidence. Less than 15% fell within the

low malaria (13.89%) and moderate (12.5%) household category. In all household had an episode of malaria or more.

Table 3. Description of household composition and malaria episodes during the period of study

Months	Children F, (%)	Male Adults F, (%)	Female Adults F, (%)
May	39 (19.89)	13 (14.2)	12 (16.9)
June	25 (12.75)	8 (8.79)	8 (11.3)
July	21 (10.71)	13 (14.2)	6 (8.5)
August	21 (10.71)	12 (13.19)	11(15.5)
September	5 (2.25)	10 (10.98)	8 (11.3)
October	44 (22.44)	18 (19.78)	16 (22.5)
November	26 (13.26)	12 (13.19)	6 (8.5)
December	15 (7.65)	5 (5.49)	4 (5.6)

Source: Field survey, 2012

Result from Table 5 presents the input of household with high, moderate and low malaria incidences. Result revealed that the total area of the land cultivated by household with high malaria incidence is 1.8 hectares. The estimated mean labour used by high malaria incidence household was 99.0 man-days of family labour and 14 man-days of hired labour giving a total labour of 113 man-days per hectare. The average planting material (seed),used by high malaria incidence households was 1108.02 grain equivalent weight. A typical household with high malaria incidence used an average 1.25 liters of chemical on their farm and an average of 21.70 kg of fertilizer. Analysis of input utilized by households with moderate malaria incidence revealed that on the average, household cultivated 1.46 hectares of land, utilized 79 man-days of family labour and employed 13 man-days of hired labour for farm operations.

Results further revealed that households used a maximum of 3 liters of chemical to spray their farms but did not make use of fertilizer input. Households with low malaria incidence cultivated an average of 2.12 hectares of land. Household used an estimated mean labour of 118.42 man-days of family labour and employed 13 man-days of hired labour on their farm. Result

further revealed that average of 975.79 GEW of planting material was used for their production.

Table 4. Proportion of malaria in the farming household

Incidence	Frequency (%)
High	53 (73.6)
Moderate	19 (12.5)
Low	10 (13.9)

Source: Field Survey, 2012

The household also used an average of 1.9 liters and 15kg of chemicals and fertilizer respectively. As expected, households with low malaria incidence used more family labour (118 man-days) than households with moderate (79 man-days) and high (99 man-days) malaria incidences. Results further revealed a significant difference in the total man-days employed by the household with different levels of malaria incidence.

More land (2.2 hectares) and chemicals (19 liters) were used compared with those used by moderate and high malaria incidence households respectively. These levels of input utilization together with the low level of malaria incidence could explain the higher output realized.

Analysis of variance comparing the input of malaria morbidity household (table 5) revealed that all the inputs used in production, land, family labour, seed, chemical and fertilizer were significant at 5% level except for hired labour.

This shows that the level of the variables used were significantly different implying variability in the level of input used. Hired labour input was not significantly different for all categories of malaria morbidity households. All the categories employed 13 man-days of hired labour as such there was no variability in all farming households regarding hired labour.

Table 5. Analysis of variance comparing the input levels of malaria household

Variables	High	Moderate	Low	F- Value
Land	1.83	1.46	2.12	10.93***
Family labour	99.20	79.25	118.42	1134.59***
Hired labour	13.70	13.00	12.68	0.462 ^{NS}
Seed	1108.02	930.33	975.79	127.18***
Chemical	1.25	0.44	1.9	157.36***
Fertilizer	21.70	0.00	15	187.17***

Source: Field survey, 2012; ***Significance at 1% level probability

Result showed that there is a high variability in the levels of output of the malaria household categories at 5 % level of probability and F-value of 9.44. This suggests that the study area has a high potential of increasing their output if preventive measures against malaria are taken.

Table 6. Analysis of variance comparing the output level of malaria households

Malaria incidence	Output (kg)	F- value
High	10,603.48	9.44**
Moderate	12,966.08	
Low	16,900.47	

Source: Field survey, 2012

4. Conclusion

It can be inferred from the findings of the study that there is high malaria incidence in the study area. The study established a great variation in the

crops produced among household incidence categories in the study area, and variation in the use of family labour, seed, land and fertilizer inputs. Crop output is higher for low malaria morbidity households.

Policy on free medical care, treatment and drugs should be enacted; this would improve the treatment – seeking behavior of households towards malaria.

Awareness should be created on the use of mosquito nets. Mosquito net should be distributed to the study area free of charge and a follow up mechanism should be put in place to ensure the use of the mosquito net

Government should improve the provision of input such as fertilizer, improved seed and chemical to boost the productivity and output levels amongst households in the study area. This

could be made possible by establishing proper channels through which these inputs could reach the farming households at the appropriate time and at subsidized and affordable rate.

Young farmers should be encouraged to take up farming in the study area as most of the household heads are old. Agricultural policy that would attract young people with high level of education into farming through empowering them would increase the productivity level of farming household. Vis a vis early detection and proper treatment of malaria in the study area.

Ulimwengu J.A (2009). Farmer's health and agricultural production in rural Ethiopia. *African Journal of Agricultural and Resource Economics* 3 (2) 83-100.

References

- Aheisibwe AR (2008). The effect of Malaria on Agricultural Production in Uganda; An MSc thesis submitted to the School of Graduate Studies, Makerere University.
- Anonymou (2017) [Http://en.wikipedia.org/wiki/Kabba/Bunnu](http://en.wikipedia.org/wiki/Kabba/Bunnu) (Accessed 2nd February 2017).
- Asante FA (2009). The Links between Malaria and Agriculture, Reducing Malaria Prevalence and increasing Agricultural Production in Endemic countries. Presented at a Conference on Improving Vector Control Measures for the Integrated Fight against Malaria: From Research to Implementation. Paris, France 2009.
- Breman J Mills A Snow R Steketee R White N and Mendis K (2006). Conquering Malaria. In *Disease Control Priorities in Developing Countries*. 2nd Ed. DT Jamison, JG.
- Izuchukwa O (2011). Analysis of the Contribution of Agricultural Sector on the Nigeria Economic Development. *World Review of Business Research* 1(1): 191-200.
- Mohammed AB Adewumi MO and Mokuolu OA (2015). Effect of Malaria on Crop Productivity among Farming Households in Kabba/Bunnu local Government area of Kogi State, Nigeria. An unpublished Ph.D. Thesis presented to the Department of Agricultural Economics and Farm Management, University of Ilorin Nigeria.
- National Bureau of statistics NBS (2015). Annual Report for the year 2015.
- National Malaria Control Programme (NMCP) (2006). Nigeria LQAS Baseline Household Survey. Federal Ministry of Health, Nigeria.
- Nigeria Gross Domestic Product GDP (2017). Report for the quarter 2017.
- Sachs J and Malaney P, (2010). The Economic and Social Burden of Malaria. *Insight Review Articles*. Center for International Development, John F. Kennedy School of Government, Harvard University.
- Seaman J and Yeyer U (1978). *Management of Nutritional Emergencies in Large Populations* WHO, Geneva.