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Effect of Malaria on Farming Households' Welfare in Ido Local Government Area of Oyo State, Nigeria

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ABSTRACT This study examined the effect of malaria morbidity and associated incapacitation on the welfare of farming households. Multi-stage random sampling procedure was used for sampling 120 farming households and data were analyzed using both descriptive and multiple regression techniques. The findings show that 33.33% used mosquito nets to prevent malaria, while 79.17% visited medical practitioners when sick of malaria. Morbidity due to malaria infection affected farmers' welfare through days of incapacitation with average of 12 days per annum and estimated average annual per capita income loss of ₦ 26,694.17. The regression results showed that increase in age of farmers and food expenditure significantly reduced households' income, while farm size, non-food expenditure, total income lost due to malaria and travelling time increased it ($p<0.10$). It was recommended that more efforts at reducing malaria morbidity can be addressed through awareness creation and initiatives to provide subsidized malaria treatments to the poor should be considered.

INTRODUCTION

With about 3.3 billion people at the risk of malaria infection in 2011, the disease is obviously one of the major health challenges in the world today. By whatever evaluation standards, sub-Saharan Africa (SSA) definitely is malaria's hot spot accounting for about 80 percent and 90 percent of reported cases and deaths respectively. Malaria's health burdens are also disproportionately felt by children under the age of five and pregnant women. Among children, severe malaria infection can inhibit mental development, while pregnant women are susceptible to premature delivery. Malaria is a health problem that results from mosquito bites. The parasite can belong to the *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*. However, malaria infection from *P. falciparum* is the most deadly and most predominant in Africa (World Health Organization 2012).

The frequency of malaria illness and criticality of associated morbidity often portend the disease as a serious economic problem. In many African communities, malaria is a household name with diametrically strong resilience and adaptability to different combinations of drugs. Although often referred to as the disease of the poor, difficulties in malaria prevention are often associated with poor housing conditions, which enhance mosquito breeding and exposure of household members to their deleterious bites (World Health Organization 2012). In many instances, drug resistance of malaria parasites is promoted by inability of some infected people to afford proven medications or not being able to use prescribed drugs, among others (Narain 2008; Hussain et al. 2009). The severity of malaria infection is also directly related to possessed immunity, while children are often attacked more frequently than adults.

In Nigeria, malaria constitutes serious economic burdens to households through incapacitation and diversion of vital households' productive resources to treatment of the sick. Ugbomoiko (2013) submitted that hundreds of millions of people living in sub-Saharan Africa are afflicted with malaria parasites, while about 25 percent of them may simultaneously experience one or more infections. It was further noted that economic cost of malaria to the country could be in the range of 1-6 percent of annual Gross Domestic Product (GDP). Recent data from World Health Organization (2012) indicated that between 2005 and 2009, expenses by the Federal Government of Nigeria (FGN) (excluding all costs at the sub-national levels) and donor agencies like the World Bank (for monitoring and evaluation), Global Fund (for human resources and technical assistance), USAID/PMI (for anti-malarial medicines) and WHO/UNICEF (for diagnostic and Insecticide Treated Nets) rapidly increased. However, within the same period, microscopically confirmed cases and admission

increased with death from malaria infection slightly declining.

Malaria is able to fuel the Nigeria's poverty situation by inhibiting critical investment plans at the households' level. Productivity and income losses from malaria infection can be perfectly linked to growing poverty. Among rural households, this is well understood from non-involvement of majority in wage/salary jobs, timeliness of farm activities with malaria sometimes striking at critical time of planting, weeding and harvesting. The sensitivity of rural incomes to slightest idiosyncratic shock presents a scenario for understanding why malaria infection, or any illness for that matter poses great economic burden to people (Yusuf et al. 2010).

Some previous studies have analyzed the burden of malaria among rural and urban households in Nigeria. Specifically, Oluyole et al. (2011) found that incapacitation due to malaria infection among some cocoa farmers in Cross Rivers state of Nigeria was an average of 22 days. Yusuf et al. (2010) found that using the Nigeria's 2008 Demographic and Health Survey (DHS) data, 16 percent of the children had fever two weeks before the survey. However, the results showed that fever was highest among children from the poorest households (17%), while 83.7 percent of those with mosquito bed nets did not report fever. Salihu and Sanni (2013) examined the trend of malaria burden and the effectiveness of malaria control measures in Kwara State, Nigeria. It was found that about 37 percent of the respondents reported to have had malaria attacks, while average of 3 days were lost by sick adults, and 2 days by the caregivers. Estimated total cost of malaria illness in Nigeria was ₦ 2,231.34 billion, which is about 7.3 percent of the GDP in 2011. This represented a reduction in national malaria burden which was 13.3 percent in 2003. Although such estimated cost is essential for policy information, non-representativeness of the data can constitute significant source of errors.

Given the severity of its impacts, it is imperative to examine the incidence of malaria among farming households. This will in some ways enhance our understanding of the critical linkages between malaria and agriculture. This paper therefore analyzed the incidence of malaria and its impact on households' welfare in a selected local government area (LGA) of Oyo state. In the remaining parts, we have presented the materials and methods, results and discussion and conclusion.

MATERIAL AND METHODS

Study Area

The study was carried out in Ido Local Government Area (LGA) of Oyo state. According to 2006 National Population Census, the total population in the Local Government was 103,261 people (National Bureau of Statistics 2009). The people are mainly small-scale farmers with secondary occupations like hunting, trading, artisan, civil service, among others. Farmers in the area grow mainly food crops such as maize, cassava, yam, vegetables. They also engage in the cultivation of some cash crops like cocoa, kola and oil palm etc.

Sampling Procedures

The data were collected by using multi-stage sampling procedure. The first stage involved selection of three farming communities which were Ido, Omi-Adio and Idi-Iya. The communities were purposively selected because they constitute centers of intensive traditional agricultural activities and some of their agricultural practices have potentials for promoting breeding of female anopheles mosquitoes. The next stage was random selection of 40 households from each of the chosen communities. Structured questionnaires were administered to the respondents. The questions were translated into the local language (Yoruba) for proper understanding by the respondents. Data collected include socio-economic profiles, malaria incidence and its impacts on farm labour availability/allocation and treatment choices.

Method of Data Analysis

The study made use of Ordinary Least Square (OLS) regression analysis to analyze the effects of malaria on farming household welfare. In the regression analysis, households' income was used to capture households' welfare as the dependent variable. Several functional relationships were tested among which semi-log gave the best results based on economic, econometric and statistical criteria. This model can be stated as:

$$Y_i = Log\ \alpha + \beta_j \sum_{j=1}^{a} Log\ X_{ij} + \delta_k \sum_{k=1}^{z} D_{ik} + e_i$$

In the stated model, , α β_j δ_K and are the parameters to be estimated. The independent variables (X_{ij}) that were included are age of the

farmer (years), farm size (hectares), total days of incapacitation, food expenditure in Naira, non-food expenditure in Naira, total income lost due to malaria in Naira, travel time to point of treatment, treatment cost in Naira, while the dummy specified variables (D_{ik}) are drug availability (yes = 1, 0 otherwise) and marital status (married = 1, 0 otherwise). e_i represents the error term.

RESULTS AND DISCUSSION

Socio-economic/Demographic Characteristics of Respondents

The socio-economic characteristics that were considered in the study include the farmer's sex, age, marital status, educational level, years of farming experience etc. The findings are presented in the Table 1. The Table shows that 60% of the respondents were males.

Table 1: Socio-economic profiles of the respondents

	Frequency	*Percentage*
Gender		
Female	48	40
Marital Status		
Singles	27	22.50
Married	74	61.67
Divorced	9	7.50
Widow(er)s	10	8.33
Household Size		
1-2	1	0.83
3-4	39	32.50
5-6	43	35.83
7-8	27	22.50
9-10	7	5.83
11-12	2	1.67
13-14	1	0.83
Age of Respondents		
21-30	16	13.33
31-40	26	21.67
41-50	26	21.67
51-60	26	21.67
61-70	22	18.33
71-80	4	3.33
Tribes of Household		
Yoruba	93	77.50
Igbo	9	7.50
Hausa	6	5.0
Effik	3	2.50
Others	9	7.50
Educational Status		
No formal education	23	19.97
Primary education	31	25.83
Secondary education	31	25.83
Tertiary education	22	18.33
Vocational education	13	10.83
Total	120	100

The highest percentage (61.67%) of the respondents were married while singles and widow(er-)s were 22.5% and 8.33% respectively. Those that were divorced constituted 7.50% of the total respondents. The mean household size was 5.23 with standard deviation of 2.83. Farm households often depend on the pull of their family labour to carry out some labour intensive farm operations. In addition, household members can contribute in taking care of another sick member since labour is often allocated for the collective goal of profit maximization.

Average age of the respondents was 47 years, with those between 31 and 60 years constituting the highest percentage (65.01%). Table 1 also shows that 77.50% of the respondents were Yoruba, 7.50% were Igbo, 5.0% were Hausa, 2.50% were Efik, while 7.50% belonged to other tribes. Tribal differences can also influence malaria treatment behavior because various ethnic groups may have different traditional ways of treating the disease.

The table also shows the distribution of the educational status of farming households. It reveals that 25.83% of the respondents had primary education, 25.83% had secondary education , 10.83% had vocational education. Also 19.17% received no formal education while 18.33% had tertiary education. This shows that good number of the respondents were educated and this may help in their aproach towards malaria treatment and prevention.

Respondents' Best Malaria Preventive Methods

Table 2 shows the various preventive measures that were used by the farmers. It shows that 10.83% used traditional herd called 'Ewe Oloorun', 6.67% relied on clearing their environment as a good way of preventing malaria, 2.50% kept the drainage system very clean and 33.33% were using mosquito net (treated or untreated), Also, 12.50% of the respondents used mosquito insecticide spray, mosquito repellant was chosen by 0.83% and 6.67% used coil insecticide. However, 9.17% of the farmers used preventive drugs while 13.33% used a combination of several preventive methods.

Distribution of Respondents on How Often They had Malaria

Table 3 shows that 2.50% of the respondents were sick of malaria once in a month and 9.17%

Table 2: Respondents' best malaria preventive measures

Best preventive measure	*Frequency*	*Percentage*
Herb	13	10.83
Clearing of environment	9	6.67
Drainage	3	2.50
Use of mosquito net	40	33.33
Insecticide spray	15	12.50
Use of repellant	1	0.83
Use of mosquito coil	8	6.67
Preventive drugs	11	9.17
Nothing	0	0
Combination of all	16	13.33
Physical killing	5	4.17

were sick of malaria once in every two months. However, majority (36.67%) had malaria once in three month making it about four times in a year. This is in line with findings of Alaba and Alaba (2002). Also, 15.83% had malaria once in every six months (twice in a year), 25.83% of the respondents recorded that they fall sick of malaria once in a year while 10.00% mentioned others. The degree of falling sick of malaria also tells much about farming household welfare as frequent malaria sickness affect the household income.

Table 3: Distribution of respondents based on number of malaria episodes

Malaria episode	*Frequency*	*Percentage*
Once a month	3	2.50
Once in two months	11	9.17
Once in three months	44	36.67
Once in six months	19	15.83
Once in a year	31	25.83
Others	12	10.00

Distribution of Respondents on Where They Consult When They Were Sick of Malaria

Table 4 shows that 10.83% of the respondents visited traditional medical practitioners that administer concoctions when they were sick of malaria. The highest number of the respondents (79.17%) said they prefer to visit medical practitioners (doctors of public hospitals, private hospitals and chemists), 4.17% visited Imams, 5.0% visited Pastors. These findings imply that majority of the respondents had good knowledge of effectiveness of modern day medicine in tackling malaria. This can invariably facilitate farming household welfare due to likelihoods of having lesser days of incapacitation.

Table 4: Distribution of respondents on where they consult when they are sick of malaria

Where they consult	*Frequency*	*Percentage*
Herbalist	13	10.83
Medical practitioners	95	79.17
Imam	5	4.17
Pastor	6	5.0
Others	1	0.83
Total	120	100

Respondents Mean Day of Incapacitation

Average days of incapacitation due to malaria in a year was 12.18. Similar finding had been reported by Alaba and Alaba (2002). This shows how terrible malaria is to the well-being of farmars as they cannot work or command any economic value during those days. Table 5 shows the mean cost expended by farming household on malaria per annum, the treatment cost is ₦ 8,513.33, total cost of incapacitation is ₦ 15,534.17, total cost of prevention is ₦ 2,647.083, total cost due to malaria is ₦ 26,694.17, total food expenditure is ₦ 177,839, total non food expenditure is ₦ 110082.7 and the respondents are with average income of ₦ 634,304.2/annum, that is, ₦ 52,858.68 per month. This also implies that respondents lost 4.21% of their income per annum on malaria.

In addition, malaria carries with it two categories of costs which are morbidity and mortality costs. Malaria morbidity affects households' welfare through reallocation of productive resources for treatment of illness and decline in productivity through loss of labour time (Alaba and Alaba 2002). The total cost due to malaria was computed as the sum of malaria treatment cost, cost of malaria prevention and cost of days of incapacitation. These gives an average of 26,694.17.

Table 5: Respondents cost implication of malaria on household welfare

Cost category	*Annual mean cost per farm household (₦)*
Treatment cost	8,513.33
Total cost of incapacitation	15,534.17
Total cost of prevention	2,647.08
Total cost due to malaria	26,694.17
Total food expenditure	177,839.00
Total non food expenditure	110082.70
Total household income	634,304.20

Effects of Malaria on Households' Welfare

For the regression analysis, STATA 10 software was used. Semi-logarithm functional form gave the best fit and was chosen as the best functional form that explained the causal relationship between per capita income (proxy for farmers welfare) and malaria incidence that was captured by the total cost of days of incapacitation, total cost of prevention and total cost of treatment (malaria morbidity approach). Based on the consideration of statistical and economic criteria, the results are presented in Table 6.

Table 6: Semi logarithm functional form showing the effect of malaria illness on the per capita income of farmers

Variables	*Coefficient*	*t-value*	*Probability*
Constant	2.323636	0.99	0.325
AGE	-1.016069	-2.81	0.006
TNFD EXP	.2358402	2.48	0.015
MARISTA	-.7193006	-1.67	0.098
TFD EXP	-5.762096	-2.11	0.037
TRAV TIME	.1716493	1.77	0.079
TCD MAL	.5033172	2.08	0.041
TRT.COST	.1995752	1.36	0.178
FRM SIZ	.1416159	1.51	0.133
TDI	-.166073	-0.84	0.404
DDA	.0163982	0.09	0.926

The dependent variable was per capita annual household income, while the statistically significant independent variables were age, total non food expenditure, marital status, total food expenditure, travelling time to point of treatment and total cost due to malaria. The R^2 was 0.527 showing that 52.7% of the variations in the farmers' incomes were explained by the explanatory variables. This also shows that the model produced a good fit for the data since the computed F-value was statistically significant ($p<0.01$).

Age was statistically significant ($p<0.01$), total non food expenditure (TNFDEXP) , total food expenditure (TFDEXP) and total cost due to malaria (TCD MAL) are statistically significant ($p<0.05$) while marital status (MARISTA) and travelling time (TRAV TIME) are statistically significant ($p<0.10$). However, the rest four exogenous variables such as total day of incapacitation (TDI), farm size (FRMSIZ), treatment cost (TRTCST) and degree of drug availability (DDA) were not statistically significant ($p>0.10$).

However, the negative sign of the coefficient of age (-1.016069) implies that farmers' income decreased as age increased. This is expected because productivity of farmers decreases as they approach old age due to loss of agility and strength. Annual income also decreased with increase in days of incapacitation due to malaria infection (-.166073). This is also expected because more the number of days the farmers are not able to attend to their production activities, the greater the loss incurred during treatment, and the lesser the annual income. Also, the parameter of farm size (0.1416159) was with positive sign indicating that annual income increases with increase in acreage of land cultivated by the farmers.

The negative sign of the coefficient of food expenditure parameter (-5.762096) implies that as income increased, consumption expenditures on food decreased. Also, the parameter of non-food expenditure (0.2358402) shows that an increase in non-food expenditure as income of farmers' increases. This is expected because the greater the income of the farmers, the more they tend to spend on and non-food items some of which may be capital or investment goods. Lastly, the parameters of total income lost due to malaria (.5033172) had positive coefficients. This implies that as the estimated income loss due to malaria increased, income also increased. This is giving some insights that wealthy farmers were incurring more cost due to malaria infection than their poor counterparts. This is expected because ability to seek qualitative treatment depends so much on the income level of the farmers. The parameter of travelling time (.1716493) had positive coefficients which indicated that as travel time to the place of seeking treatment increased, households' income also increased. The finding points at the fact that the richest among the farmers were able to afford malaria treatment from better hospitals which are far away from the villages.

CONCLUSION

Malaria is both a health and economic problem that has eaten deeply into the financial base of the victims and/or their caregivers. Malaria has become a serious threat in Africa, especially in rural areas because of low level of awareness and low usage of modern preventive measures against mosquitoes that cause malaria. The use

of preventive measures and proper treatment of malaria are very critical for morbidity. In addition, poor sanitation condition of farmers is also one of the major causes of high malaria incidence in the rural areas. Furthermore, increase in malaria incidence increases days of incapacitation, which in turn reduces annual income by average of 4.21%. Finally, there is a significant reduction in the productivity and also the income (and welfare) of the farmers, although households with higher income were able to seek treatments from distant hospitals which are far better in terms of service delivery.

RECOMMENDATIONS

Based on the findings, it is recommended that there should be proper orientation of farmers on the cause, effects and danger of malaria as well as its economic implication on their well-being just like that of HIV crusade. There should also be more serious interventions by the government in form of consistent mobilization of resources, formulation and implementation of policies and programmes that will promote awareness and measures that ensure effective prevention and control of malaria. The findings consistently pointed at inability to seek effective health services due to low income level. It is therefore imperative for Nigerian Government to consider offering of malaria treatments free of charge for poor households, in order to reduce the economic burden of the disease of households.

REFERENCES

Alaba OA, Alaba OB 2002. Malaria in Children: Implications for the Productivity of Female Caregivers in Nigeria. *Proceeding of Annual Conference of the Nigerian Economic Society (NES)*, pp. 395-413.

Hussain NA, Echoja AD, Iwarere O 2009. Pattern of malaria prevention and treatment at Obisesan, Nigeria. *European Journal of Scientific Research*, 27(1): 120-127.

Narain JP 2008. Malaria in the south-east region: Myth and the reality. *Indian Journal of Medical Research*, 128: 1-3.

National Bureau of Statistics 2009. *Annual Abstract of Statistics 2009*. Federal Government of Nigeria, Abuja.

Oluyole KA, Ogunlade MO, Agbeniyi SO 2011. Socio-economic burden of malaria disease on farm income among cocoa farming households in Nigeria. *American-Eurasian Journal of Agriculture and Environmental Science*, 10(4): 696-701.

Saliu OM, Sanni NA 2013. Malaria burden and the effectiveness of malaria control measures in Nigeria: A case study of Asa Local Government Area of Kwara State. *Journal of Economics and Sustainable Development*, 4(3): 295-308.

Ugbomoiko US 2013. *That We May Lay Siege.* 134th Inaugural Lecture at the University of Ilorin.

World Health Organization (WHO) 2012. *World Malaria Report 2012.* Geneva: WHO.

Yusuf OB, Adeoye BW, Oladepo OO, Peters DH, Bishai D 2010. Poverty and fever vulnerability in Nigeria: A multilevel analysis. *Malaria Journal*, 9: 235.