Influence Of Malaria Incidences on LifestyleAndFarming ActivitiesOf Rice FarmersIn South-West Nigeria

Abstract

Malaria is a major issue in the tropics, causing lost work hours, reduced production quality, decreased income, and even death. This study explored how malaria impacts the lifestyle and farming activities of rice farmers in Southwest Nigeria. Data were collected from 277 rice farmers through structured interviews and focus group discussions, focusing on socioeconomic characteristics, malaria incidence frequency, treatment methods, vector control practices, lifestyle changes due to malaria, and perceived effects on farming activities.

Analyses included Pearson Product Moment Correlation (PPMC), Chi-square analysis, Analysis of Variance, and Linear and Logistic regression. Findings revealed that 59.93% of farmers were male, 87.00% were married, and 33.50% had secondary education. The average age was 48, with an annual income of N557,813. About 40.07% reported monthly malaria incidents, and 71.12% used patent medicine stores for treatment. Many farmers (62.82%) killed mosquitoes manually, and 73.65% said malaria delayed rice processing. Most identified mosquito bites (92.42%), work stress (90.25%), and socioeconomic status (89.89%) as predisposing factors. Lifestyle changes due to malaria included skipping meals (85.92%) and self-medication (81.95%).

Significant relationships were found between age and lifestyle changes (PPMC, $p<0.05$). Chi-square analysis showed significant associations between sex, marital status, education level, and rice cultivation type with lifestyle changes due to malaria. Linear regression indicated that marital status, household size, income, and farm size significantly affected perceived malaria impacts on farming activities. Logistic regression revealed a significant relationship between lifestyle changes and malaria carrier status. The study concluded that malaria significantly influences the lifestyle of rice farmers, recommending campaigns to discourage self-medication through media, healthcare personnel, and extension officers.

Keywords - Malaria, Rice farmers, Tropics, Nigeria, Socioeconomic impact, Vector control, Lifestyle changes, Self-medication, Treatment methods, and Farming activities.

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Introduction

Background to the Study

Health, as defined by the World Health Organization, is a dynamic state of complete physical, mental, spiritual, and social well-being, not merely the absence of disease or infirmity [1]. It involves a balance where an individual or a group's capacity to cope with life's circumstances is optimal [2]. Health encompasses anatomical, physiological, and psychological integrity, the ability to perform valued roles within family, work, and community, handle stress, feel well-being, and freedom from the risk of disease and untimely death [3]. This implies that health is a relative state where one can function well physically, mentally, socially, and spiritually, expressing their full potential within their environment.

Deviations from this state indicate 'ill health.' Ill health reduces the time available for productive activities, increases the cost of care and disease prevention, reduces leisure time, and causes discomfort due to sickness [4]. Conversely, good health increases productivity, provides opportunities for better-paying jobs, and extends working lives [5]. Agriculture and health are significantly interconnected. Key health conditions and diseases can arise from agricultural practices, impacting farmers [6]. For instance, developing water resources for agriculture affects health through interactions with the environment, income, and labor [7]. While irrigation and water storage can enhance health by increasing food yields and incomes, they can also create conditions conducive to the propagation of disease vectors, increasing the transmission of diseases such as malaria, schistosomiasis, and Japanese encephalitis[4].

Statement of the Problem

The severe impact of various illnesses on farmers in the production process is significant. In developing countries, agriculture is characterized by widespread productivity decline[8]. Despite efforts to achieve self-sufficiency in food production, productivity decline persists [9]. This decline is attributed to the health status of agricultural producers, which affects their labor supply and productivity[10]. The opportunity cost incurred when farmers are impaired is substantial [11[.

Malaria, a significant global health issue, affects productivity and development. One-fifth of the world population is at risk, with over 300 million cases annually[12]. In Nigeria, malaria hinders development by causing death and reducing productivity in all sectors, including agriculture [13]. Malaria reduces Nigeria’s GNP annually, with a significant portion of household income spent on malaria control and treatment [14]. The reduced efficacy of commonly used drugs for malaria treatment increases malaria control costs, impacting agricultural workers' income [15]. Malaria and agriculture are intimately related. Agricultural environments provide suitable conditions for disease vectors, causing malaria in humans [16]. Malaria impedes development through effects on fertility, population growth, savings and investment, worker productivity, absenteeism, premature mortality, and medical costs [17]. The effect of malaria on smallholders is devastating, affecting land cultivation, cropping patterns, and farm productivity [18].

Efforts to curb malaria in Nigeria are hindered by inadequate sanitation legislation, illiteracy, poverty, poor environmental health, and insufficient mosquito bed-net usage [19]. Consequently, malaria reduction has been slow [19]. Malaria causes loss of agricultural labor due to illness and death, family members' time and energy in caring for patients, and loss of agricultural knowledge and skills if an experienced farmer dies [20]. Malaria accounts for a significant portion of public

health expenditure and negatively impacts the annual gross national product, with a substantial reduction in household income attributed to malaria control and treatment [22].

A critical link between malaria and agriculture is irrigation [19]. While irrigation can boost agricultural productivity in Africa, it also provides breeding sites for mosquitoes that transmit malaria [23]. Rice, a staple crop in sub-Saharan Africa, relies on flooded paddies, creating breeding sites for a principal malaria vector [24]. Malaria presents serious consequences for small-scale rice farmers, including loss of work hours, poor quality production, low output, loss of income, and even death[20]. Preventing malaria resurgence is essential to maintain an efficient agricultural workforce. This study aims to answer the following research questions:

1. What is the frequency of perceived malaria incidences among rice farmers in Southwest Nigeria?
2. What are the sources through which rice farmers seek health attention for malaria treatment?
3. What malaria vector control practices do rice farmers utilize?
4. What are the perceived effects of malaria incidences on rice production?
5. What factors predispose rice farmers to malaria?
6. What lifestyle habits do rice farmers adopt due to malaria incidence?
7. What is the malaria/plasmodium carrier status of rice farmers in Southwest Nigeria?

Hypotheses of the Study

1. There is no significant relationship between selected socio-economic characteristics of rice farmers and their lifestyle habits influenced by malaria incidences.
2. There is no significant relationship between selected socio-economic characteristics of rice farmers and their perceived effects of malaria incidences on rice farming activities.
3. There is no significant relationship between rice farmers' lifestyle habits influenced by malaria incidences and their malaria/plasmodium carrier status.
4. There is no significant difference in the malaria/plasmodium carrier status of rice farmers across study locations.

Literature Review

Malaria remains one of the most significant public health challenges worldwide, especially in tropical and subtropical regions where it continues to inflict substantial morbidity and mortality [25]. This literature review seeks to explore the extensive body of knowledge surrounding malaria, examining its biological underpinnings, historical impact, socio-economic implications, and the diverse strategies employed to control and eradicate the disease. By delving into various scholarly articles, historical documents, and recent studies, this review will highlight the evolution of malaria research and control efforts, elucidate the complexities of its transmission dynamics, and discuss ongoing challenges and advancements in the fight against this pervasive disease. The goal is to provide a comprehensive overview that not only encapsulates the current state of malaria research but also identifies gaps in knowledge and opportunities for future investigation. Through this synthesis, the review will contribute to a deeper understanding of malaria's global impact and the multifaceted approaches needed to combat it effectively.

Introduction to Malaria Malaria is a severe infectious disease transmitted by Anopheles mosquitoes and caused by Plasmodium parasites, with the most affected regions being tropical and subtropical areas across the globe [14]. This disease presents with varying symptoms,

primarily fever and headache, escalating to severe complications such as coma or death in critical cases[26]. Among the different species of Plasmodium, P. falciparum and P. vivax are notable for their lethality [14]. Effective strategies for prevention and control include insecticide-treated nets, indoor residual spraying, and therapeutic antimalarial medications [9].

Historical Context of Malaria Malaria has been recognized and described since ancient times, with references found in Chinese and Indian writings and even in the works of Hippocrates [27]. The connection between malaria and swampy environments was noted by ancient civilizations, leading to efforts like the Roman drainage projects to combat the disease[28]. The discovery of the malaria parasite by Alphonse Laveran in the 1880s, and the subsequent elucidation of its transmission through mosquitoes by Sir Ronald Ross, marked a pivotal shift in understanding and controlling malaria, focusing on the mosquito vector [29].

Malaria's Impact on Human History and Socioeconomics Throughout history, malaria has significantly impacted human settlements, military operations, and economic expansions, particularly in tropical regions where it is most prevalent [30]. The disease has also influenced human evolution, with genetic adaptations such as the sickle cell trait providing resistance to malaria, illustrating a direct link between the disease and genetic selection [31]. Economically, malaria imposes substantial costs through direct healthcare expenses and indirect impacts such as lost productivity and inhibited economic development [32].

Control and Eradication Efforts Malaria control has evolved from early treatments with quinine to modern therapies including artemisinin-based combination therapies (ACTs) [33]. Despite successes in eradication in temperate regions through aggressive mosquito control and public health campaigns, challenges remain in tropical areas due to the mosquito's breeding habitats and the socio-economic environment[34]. The emergence of drug-resistant strains of Plasmodium calls for continuous research and development of new pharmaceuticals [35].

Modern Challenges and Integrated Control Strategies The contemporary approach to malaria control is multifaceted, involving public health interventions, vector management, and community education to reduce the incidence of the disease [36]. Innovations such as genetically modified mosquitoes and environmental management strategies are being tested to disrupt the transmission cycle [37]. Collaboration among international health bodies, governments, and non-governmental organizations is critical for resource allocation and effective implementation of malaria programs, especially in resource-limited settings [38].

Economic and Social Implications The socio-economic burden of malaria is disproportionately borne by poorer nations where it exacerbates the cycle of poverty and disease[39]. The economic impacts are multifaceted, including direct costs related to healthcare and prevention, and indirect costs associated with reduced work capacity and economic productivity [40]. Malaria control programs need to be economically sustainable and culturally sensitive to address the specific needs of affected populations effectively [41].

Future Prospects and Global Health Goals Significant global health efforts are directed towards reducing the malaria burden with ultimate goals set for substantial reduction or eradication [42]. The path to achieving these objectives includes continued innovation in disease management, sustained funding for health initiatives, and global cooperation [43]. Goals such as those outlined in the Millennium Development Goals and subsequent Sustainable Development Goals highlight the international commitment to combating malaria [44].

Methodology

The research focuses on the southwestern region of Nigeria, an area known for its diverse geography and cultural richness. This part of Nigeria is home to six states: Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo, predominantly Yoruba-speaking with a variety of dialects. The climate in this region varies with two main seasons: the rainy season from March to October and the dry season from November to February, during which the Harmattan winds bring cold, dry air from the northern deserts [45]. The region encompasses an area of 76,852 square kilometers and supports a population of approximately 25.2 million [46].

Ekiti State, established in 1996 from the old Ondo State, encompasses 16 local government areas with Ado-Ekiti as its capital[47]. The state is recognized for its academic contributions, earning the nickname 'Fountain of Knowledge' [48]. Historically, Ekiti was independent before the British introduced indirect rule [49]. The state is characterized by its upland terrain, rising over 250 meters above sea level and covering 6,353 square kilometers [50]. It is known for its agricultural activities which employ about 75% of its populace in the production of both food and cash crops [34].

Ogun State, bordering Lagos to the south and the Republic of Benin to the west, was formed in 1976 [10]. Its capital, Abeokuta, is also the largest city. The state spans 16,980.55 square kilometers and is dubbed the "Gateway State [28]." As of 2006, it had a population of about 3.73 million. Ogun State is significant for its varied landscapes and numerous local government areas [51].

Lagos State, the smallest in terms of area but the most populous, was created in 1967 [52]. It was initially the nation's capital until 1991 when Abuja became the new capital [36]. Despite this, Lagos remains the financial hub of Nigeria. The state, with a 2015 estimated population of about 16 million, is bordered by Ogun State and the Atlantic Ocean [37]. It is a cultural melting pot, attracting people from all over Nigeria and beyond [37].

The study specifically targets rice farmers in these states, utilizing a multi-stage sampling procedure to select participants. Initially, Ekiti, Ogun, and Lagos were chosen due to their prominent roles in rice production. From these, key rice-growing local government areas were selected. A subset of farmers was then chosen from the Rice Farmers' Association of Nigeria (RIFAN) registry in these areas, totaling 277 farmers for the study.

Data was collected using an interview guide designed to understand various aspects of rice farming and the impact of malaria. The guide was validated for both face and content by experts in Agricultural Extension and Rural Development, ensuring the removal of ambiguous items and clarity in the presentation.

The reliability of the research instruments was tested through a method involving repeated testing among a small group of farmers outside the main study area, confirming the consistency of the tools used.

In assessing the impact of malaria on rice farming, several factors were considered, such as the frequency of malaria incidents among farmers, the sources of health care during malaria outbreaks, and the control practices utilized against malaria vectors. The study also examined how malaria affects the farmers' productivity and lifestyle, including their work habits and social activities.

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Finally, the research aimed to evaluate the relationship between socio-economic characteristics of rice farmers, their malaria experiences, and their status as malaria carriers. Various statistical tools were employed to analyze the data collected, including correlation tests, regression analyses, and variance analyses to explore the different hypotheses posed by the study.

This comprehensive approach aims to provide a detailed understanding of the interplay between agriculture, health, and socio-economic factors in the lives of rice farmers in southwest Nigeria, offering insights that could inform future policies and interventions in similar contexts.

Results and Discussion

The socio-economic profile of rice farmers in a certain study area highlights important demographic and economic characteristics crucial for understanding the dynamics of agricultural production [41]. An analysis of data from Tables 1 and 2 reveals that a significant portion of these farmers, approximately 56.68%, are aged between 31 and 45 years, with an average age of 47.6 years. Furthermore, about 35.74% are older than 50 years. This demographic suggests that the majority of rice farmers are robust and capable, well-suited to manage the physical demands of various production stages [38].

Gender distribution within this community shows that 59.93% of the rice farmers are male, while 40.07% are female, indicating a substantial involvement of women in rice farming. This reflects a progressive shift towards gender inclusivity in this field, challenging traditional norms where men predominantly led agricultural activities.

Marital status also plays a role in the socio-economic landscape, with 87% of the farmers being married and only 5.78% being single. This high percentage of married farmers underscores a mature and potentially more stable demographic, which might translate into a responsible approach not only towards family matters but also in their professional and community engagements.

Economically, rice farming is just one aspect of their livelihood. A significant number (65.70%) engage in other forms of crop production, while 20.58% participate in trading, indicating a tendency towards income diversification. This strategy is likely adopted as a means to achieve greater food and financial security.

In terms of household size, most rice farmers have families ranging from three to eleven members, with an average household size of seven. This suggests that larger family units might also contribute labor to farming activities, a factor that enhances productivity and provides a buffer against labor shortages.

Educational attainment among rice farmers varies, with 35.74% having completed primary education, and a smaller fraction, 7.22%, reaching tertiary education levels. The data also shows that 22.02% of the farmers have no formal education, indicating a gap that could potentially affect the adoption of modern farming techniques and business practices.

Financially, the annual income for most farmers (63.54%) ranges between N100,000 and N700,000, with a mean annual income of N557,813. Despite this, there remains a need for further economic diversification to enhance financial stability, given that only a small portion (13.36%) reaches the higher income bracket of N500,001 to N700,000.

Land use patterns also reflect the scale of operations, with most farmers (62.82%) cultivating between 1 and 4 hectares. This scale is manageable and likely tailored to the resources available to them. Furthermore, 62.09% dedicate a similar portion of land exclusively to rice cultivation, indicating a focused approach to this crop. However, only a very small group (2.17%) operates on more than 12 hectares, pointing to limited access to larger land holdings for many farmers.

In terms of cultivation practices, 72.56% of farmers engage in lowland rice cultivation, which is more common than upland cultivation, practiced by only 10.47%. This preference is largely influenced by the geographical conditions of their respective areas, which dictate the suitability of lowland over upland farming.

Table1:Personalcharacteristicsoftherespondents(n=277)

Variables		>14	48
	Frequency	**Source:Fieldsurvey,2017**	
Age			
<31	21		
31 – 35	26		
36 – 40	47		
41 – 45	42		
46 – 50	42		
>50	99		
Sex			
Male	166		
Female	111		
Maritalstatus			
Single	16		
Married	241		
Widowed	18		
Separated	1		
Divorced	1		
IncomeGeneratingactivities			
Apprentices	24		
Trading	57		
Civil servant	6		
Animal husbandry	8		
Crop production	182		
Householdsize			
<3	23		
3 – 5	62		
6 – 8	97		
9 – 11	34		
12 – 14	13		

Comment [gs4]: Data are not updated

Percentage	**Mean**	0.36	
		0.36	
7			
.		8.66	
5		20.58	
8		2.17	
		2.89	
9		65.70	
.			
3		8.30	
9		22.38	
		35.02	7
1		12.27	
6		4.69	
.		17.33	
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Table2:Personalcharacteristicsoftherespondents(n=277)

Variables	**Frequency**	**Percentage**	**Mean**
Educationallevelattained		22.02	
No formal Education	61	1.44	
Adult Education	4	35.74	
Primary Education	99	33.57	
Secondary Education	93	7.22	
Tertiary Education	20		
EstimatedIncome(₦)<100,000		1.44	
	4	31.41	
100,000 – 300,000	87	32.13	
300,001 – 500,000	89	13.36	557,813
500,001 – 700,000	37	21.65	
>700,000	60		
Farmsize(ha)		2.53	
< 1	7	62.82	
1 – 4	174	22.38	5.5
5 – 8	629	4.69	
– 12	13	7.58	
>12	21		
FarmsizeforRiceCultivation(ha) <		4.33	
1	12	81.95	3
1 – 4	227	8.30	
5 – 8	239	3.25	
– 12	9	2.17	
>12	6		
NatureofRiceCultivated Lowland		72.56	
rice	201	16.97	
Upland rice	47	10.47	
Both	29		

Source:Fieldsurvey,2017

EffectofMalariaIncidenceonRiceyield(intonnesperhectare)

The findingsinTable 3showthatmajority(70.40%) ofricefarmersharvestedbetween2 and5tonnes/hectareofricewithmeanof3.51tonnes/hawhennotdownwithmalaria whereas some (22.73%)of them harvestedless than 2 tonnes/ha when down with malaria withmeanof2.94tonnes/ha.Thisbyimplicationmeansthatthereisaninfluenceof malariaincidenceon rice productivity. Oluwatayo[11]corroborated this assertion and opined that the poor agricultural production is greatly influenced by situation of endemic malaria in West and Central Africa. Oneof theresponsesof the respondents is presented below:

Table3:EffectofMalariaIncidenceonRiceyield(intonnesperhectare)(n=277)

Averagetonnes	**Frequency**	**Percentage**	**Mean**
WithoutMalaria		16.16	3.51
< 2	462	70.40	
– 5	195	10.47	
6 – 9	29	2.53	
>10	7		
WithMalaria		22.73	2.94
< 2	632	68.94	
– 5	191	7.93	
6 – 9	22	0.36	
>10	1		

Source:FieldSurvey,2017

QuantitativeEffectofMalariaIncidenceasexperiencedbyRiceFarmers

Findings in Table 4 present various impacts of malaria incidence on rice farming activities. A majority (79.06%) of rice farmers experienced malaria two to four times during the last production season, with an average of three times. This indicates that rice farmers typically encounter malaria three times from land clearing to marketing in a production season.

Over half (55.59%) of rice farmers spent between N1,001 and N3,000 on malaria treatment drugs, with an average cost of N4,294.72. Most (60.29%) spent between N500 and N1,100 on transportation to procure drugs, with a mean cost of N747.60. A majority (82.31%) spent two to four days treating malaria per episode, averaging four days. Additionally, most (71.84%) spent between N1,000 and N3,000 on malaria prevention, with an average cost of N1,812.10. Most (63.90%) were incapacitated for five to eight days per malaria episode, averaging six days, while a few (3.61%) were incapacitated for over thirteen days.

Table4:QuantitativeEffectofMalariaIncidenceasexperiencedbyRiceFarmers(n=277)

Variables	Frequency	Percentage	Mean
No ofTimes Ricefarmers Experiencemalaria last production season			
≤1	49	17.69	2.50
2-4	219	79.06	
>4	9	3.25	
Cost of Drugs for Malaria Treatment (₦)			
≤1,000	3	1.08	
4,294.72			
3,001-5,000	154	55.59	
3,001-5,000	86	31.05	
5,001-7,000	25	9.03	
>7,001	9	3.25	
TransportationCost of Procuring Drugs for each malaria episode (₦)			
<500	67	24.19	747.60
500-800	121	43.68	
801-1,100	46	16.61	
1,101-1,400	10	3.61	
>1,400	33	11.91	
Days spent on Treatment at each episode			
<2	13	4.69	4.00
2-4	228	82.31	
5-7	34	12.27	
>7	2	0.72	
Cost incurred inMalaria Prevention(₦)			
<1,000	51	18.41	
1,812.10			
1,000-2,000	199	71.84	
3,001-5,000	14	5,05	
5,001-7,000	8	2.89	
>7,001	5	1.81	
Days of Incapacitationby RiceFarmers			
<5	81	29.24	6.00
5-8	177	63.90	
9-12	9	3.25	
>13	10		
	3.61	**Source:Fieldsurvey,2017**	

QuantitativeeffectofmalariaonlabouratdifferentRiceFarmingActivities

The quantitative effect of malaria on labor distribution in various rice farming activities is presented in Table 5. The findings indicate the distribution of labor in rice farming both without and with malaria incidences. The mean hired labor for pre-planting operations was initially 11 but decreased to 8 due to malaria. Similarly, the mean family labor for pre-planting dropped from 9 to 7 because of malaria. For fertilizer application, the mean hired labor decreased from 18 to 13 due to malaria infection, while the family labor saw a slight reduction from 9 to 8.

During the last season's harvesting, the mean hired labor dropped from 19 to 16 due to malaria, while family labor availability remained constant at a mean of 10, regardless of malaria. These findings suggest that malaria significantly impacts labor distribution at different stages of rice production in the study area. This aligns with Ogunsola et al.[36], who found that malaria significantly affects labor supply and efficiency based on estimates and household recall data. They further noted that malaria-induced complete disability leads to a greater proportion of total effective work time loss compared to partial disability caused by malaria.

Comment [gs5]: Please show the regression analysis

Table5:QuantitativeeffectofmalariaonlabouratdifferentRiceFarmingActivities(n=277)

FarmingActivities	LabourType	MLUWM*	MLUDWM**
Preplanting	Hired Labour	11	8
	Family Labour	9	7
Planting	Hired Labour	16	11
	Family Labour	9	8
FertilizerApplication	Hired Labour	18	13
	Family Labour	9	8
Weeding and	Hired Labour	13	10
Drying	Family Labour	8	Hired 5
		Labour8	6
ControlofPestandDisease	Family Labour	6	5
	Hired Labour	19	16
Harvesting	Family Labour	10	10
	Hired Labour	11	64
Milling	Family Labour	7	55
	Hired Labour	7	76
Parboiling	Family Labour	5	65
	Hired Labour	10	
Bagging	Family Labour	7	
	Hired Labour	8	
Marketing	Family Labour	6	

Source: Field Survey, 2017

*MLUWM =Mean Labour Usagewithout Malaria

**MLUDWM = Mean LabourUsage with Malaria

Conclusion

This study aimed to evaluate the impact of malaria on the lifestyles and agricultural activities of rice farmers in South-west Nigeria, specifically in Ekiti, Ogun, and Lagos states. A multistage sampling technique was used to select 277 rice farmers for interviews. Data were analyzed using various statistical methods including frequency counts, percentages, means, Pearson Product Moment Correlation (PPMC), Chi-square tests, linear regression, logistic regression, and analysis of variance (ANOVA).

The demographic profile indicated that 59.93% of the rice farmers were males, 33.50% had secondary education, and the average household comprised about 3 to 11 persons with a mean age of 48 years. The majority of these farmers (63.54%) reported annual incomes between ₦100,000 and ₦700,000, with an average of ₦557,813. Approximately half (50.90%) practiced lowland rice cultivation and 65.70% engaged in other agricultural activities beyond rice farming.

Malaria was prevalent among the farmers, with 71.48% experiencing it between once a month and once every three months, and only 10.11% having it annually. The primary source of malaria treatment was local chemists, utilized by 71.12% of farmers. Methods for mosquito control were mostly primitive, with 62.82% using physical means like hands or brooms. The study revealed a significant impact of malaria on rice farming, particularly in processing delays and market availability, with 73.65% acknowledging malaria as a major disruptive factor.

Productivity losses were evident with 70.40% of farmers achieving 2 to 5 tonnes per hectare when healthy, but dropping to less than 2 tonnes per hectare during illness, with costs averaging ₦1,812:10 for malaria prevention. Socioeconomic factors such as household size, gender, marital status, education, and farming type correlated significantly with lifestyle changes due to malaria. However, no significant correlation was found between farmers' age, income, or farm size and lifestyle impacts from malaria.

Comment [gs6]: The conclusion should answer the aims of study based on the analysis used

The study further examined the malaria/plasmodium carrier status, with 35.38% of farmers testing positive. Despite these challenges, common malaria vector control practices and environmental management strategies were underutilized.

In conclusion, the study found that malaria incidence remains high among rice farmers, affecting their health and productivity. Frequent incapacitation and a reduction in harvested rice due to illness underscore the adverse effects of malaria. Socioeconomic challenges, such as low income and education levels, exacerbate susceptibility to malaria. The most common lifestyle adaptations included self-medication and meal skipping due to loss of appetite during malaria episodes.

Based on these findings, several recommendations were proposed:

1. Diversification of agricultural activities to enhance farmer incomes and enable better access to malaria prevention resources.
2. Improved educational efforts to inform farmers about the benefits of education in modern agricultural practices.
3. Expansion of malaria prevention programs targeting farmers specifically, providing free resources and support.
4. Enhanced healthcare infrastructure in farming communities to reduce costs and improve access to treatment and preventive care.

These measures aim to mitigate the impact of malaria on rice farmers and improve their quality of life and productivity.

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