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Impact of Malaria on Labour Productivity in Nigeria (A Study of Tertiary Institution on Imo State)

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Abstract: The study investigated the impact of Malaria on Labour productivity in Nigeria; A study of tertiary institutions in Imo state. The objective of the study is to examine the impact of malaria on Labour Productivity. The study used coded data obtained from a field survey conducted with a well-structured questionnaire. The model have Depletion of workers "Mortality" (DOW), Loss of man-hours (LMH) and Working capacity (WCM) as explanatory variable while Labour Productivity (LAB-Prod) as dependent variable. The mean response of the respondents were calculated and compared with the criterion mean to determine if the question is positive or negative. Ordinary Least Square estimate was used to analyze the impact of the Independent Variables on the dependent variable. The result revealed that DOW and WCM have positive effect on Lab-Prod while LMH has negative effect on Lab-prod. The OLS result also found LMH, WCM to have significant impact on Lab-Prod while DOW is found to have insignificant impact on Lab-Prod. The adjusted R² (0.72) shows that the model is very robust and has a good fit. The D-statistics showed that there is no presence of autocorrelation. The F-statistics showed that the explanatory variables jointly affect the dependent variable. Thus, we recommend that the Federal Government through its ministry of education should initiate policies and programmes that will build a good hospital in every institutions of higher learning to enable staffs, staffs children, students, and any biological relations of staffs to have a quality medical care at a reduced cost. This will help enhance the productivity of staffs in tertiary institutions in the country.

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1. Introduction

Malaria has remained a major threat to labour productivity despite decades of control efforts. It is a devastating disease that threatens labour productivity and economic performance of endemic countries. Malaria transmission in Nigeria is stable. All of the Nigeria's population of over 200 million people may be at risk of malaria infestation. Though there has been decline in the disease burden over the years, the incidence is relatively high. It is responsible for active work force mortality and morbidity in Nigeria. According to the World Health Organization -WHO (2022), report malaria deaths globally in 2021 is estimated to be around 619,000 when compared to 625,000 in the first year before the pandemic. Malaria can be classified as uncomplicated or severe. Reports by National Malarial Elimination Program - NMEP (2020) mission is to provide equitable, cost effective, comprehensive, efficient and quality malaria control measures to reduce malaria burden to pre-elimination levels and bring malaria mortality to zero, yet the entire country

is at risk of malaria with moderate-to-high transmission with the rate of transmission slightly lower in the Sahel regions and the high mountain area of the Plateau, where the altitude of settlements is between 1200 and 1400 meters above sea level which is considered to be at low risk of malaria, with *Plasmodium falciparum* as the dominant species. *Plasmodium falciparum* which is the most deadly species type of the parasite caused by infected anopheles mosquitoes. The truth may not be farfetched from the sarcasm that it was because of malaria the Whiteman left Nigeria which led to the calling of Nigeria the Whiteman's grave.

Malaria transmission in Nigeria is higher between April and October because of rains. Going by the reports of End malaria in Nigeria (EMN), there were over 10 million reported cases of malaria and with over 200,000 deaths annually attributed to malaria in Nigeria with amount to 31.9% of global malaria indices. These cases are predominantly pregnant women and children (NMEP, 2020). In recent years, many international malaria control programmes came into existence. The most eminent is the Roll Back Malaria (RBM) partnership which was launched in 1998 by WHO, United Nations Development Programme (UNDP), UNICEF and the World Bank. The RBM is saddled to bring government of affected countries, donors, the private sector, non-governmental organization together. Its objective is to reduce malaria deaths by 2010, also assisting affected countries to access treatment, improving malaria control and awareness. In Nigeria, the body responsible for malaria control activities is the NMCP. Malaria prevention and control are done through evaluation and monitoring stakeholders that are saddled with operational research conducted by external partners and indigenous institutions. The NMCP technically support and coordinate wide range of domestic and foreign partners in the private and public sector. In an attempt to analyze the impact of malaria on labour productivity in Nigeria, the study captured Man hour lost by workers due to malaria, working capacity of workers infected with malaria and mortality of worker due to malaria in relation with labour productivity in the selected tertiary institutions in Imo state

Any country, institutions or community where malaria thrive or flourish the most, human race have prospered least (Sachs and Maloney, 2002). Poverty is predominant in the tropical and subtropical zones, the same geographical space that are closely framed with malaria infestation. Malaria might not be the single cause of poverty in less developed nation, but the two seem to have a complex relationship. Malaria has a significant impact on workers' health which affects their productivity, which is an important non income component that can't be neglected in measuring economic impact of malaria in labour productivity. Although the correlation between malaria, loss of hours at work, low productivity and poverty is apparent because of malaria morbidity, the nature of the linkages in terms of directions and mechanism of causation is less so, and different methodological approaches may provide widely divergent perspectives concerning the impact of the disease on the productiveness of labour in any organization in Nigeria.

Many researchers like (Olalekan and Nurudeen, 2013; Onwejekwe, 2000), and (Jimoh, Chioma and Okonkwo, 2007) have also revealed that malaria may be responsible to place substantial difficulties on workers that have sick family members, these comprises possible loss of productive time from work by the infected individuals, productive time spent by an active workers on other family member, loss of productivity, other expenses like transportation and medical care, and depletion of the labour force through premature mortality. Having treated the impact of malaria on the overall labour force productivity and its incidence on the various occupational groups, to this end, the fulcrum of this current research work investigated the impact of malaria on labour productivity in the selected tertiary institutions in Imo State. To solve the above problem, the work looked at man hour lost by the workers due to malaria, working capacity of workers when infected with malaria, depletion of work force (mortality) due to malaria and how they affect labour productivity of workers in the tertiary institutions in Imo state, Nigeria.

In this study, we attempt to examine whether man hour loss of workers due to malaria, working capacity of workers during malaria related illness and rate of morality due to malaria play a role in labour productivity of tertiary institution workers.

The main objective of this research work is to investigate the impact of malaria on labour productivity.

The specific objectives are to:

1. Ascertain the impact of man hour loss of workers due to malaria on labour productivity.
2. Examine working capacity of workers due to malaria on labour efficiency.
3. Determine the rate of mortality due to malaria on labour output.

Hypotheses

The hypotheses below were the reflection of our objective which was subjected to empirical test.

H0₁: There is no relationship between man hour lost due to malaria and labour productivity.

H0₂: There is no significant relationship between working capacity of workers due to malaria and labour efficiency.

H0₃: There is no significant relationship between mortality of workers due to malaria and labour output.

Scope of the Study

This research work centers on the impact of malaria on labour productivity (A study of tertiary institutions in Imo State). Tertiary institutions in Imo state are Imo University (IMSU) Owerri, Federal University of Technology (FUTO) Owerri, Federal polytechnic Nekede, Imo state Polytechnic (IMOPOLY) Umuagwo and Alvan Ikoku Federal College of Education.

LITERATURE REVIEW

Conceptual Framework

Impact Of Malaria On Human Capital In Nigeria Economy

The impact of malaria economically cost Africa \$12 billion yearly according to estimate Gallup et al. (2001). The figure include factors such as absenteeism, man-hour loss at work due to malaria, brain damage due to cerebral malaria, cost of health care, loss in tourism and loss in investment. Malaria is considered bad business for institutions that their employees have high malaria incidence because malaria is responsible for increased sick leave, man-hour loss and decreased productivity which can have negative impact on both company's reputation and output.

Generally, African household lose up to 25% of their earnings to malaria. Prominent economist evaluate that malaria induce an economic growth penalty of up to 1.3% yearly in malaria endemic countries in Africa. Investment and tourism is discouraged by malaria incidence, also land use, crop rotation, sub-optimal agricultural production, labour productivity are also impaired by malaria incidences. However, the effect of malaria on human capital is significant due to the fact that cerebral malaria is responsible for brain damage and also contributes to reduction in labour productivity and household cash reserves through increase malaria morbidity and mortality.

Impact Of Malaria On Productivity In Human Labour

The impact of malaria on the productivity of individuals in areas of stable malaria cannot be assessed with the current state of research. Whether or not individuals are significantly debilitated by malaria, there are several other channels through which malaria could have large impacts on the economy. The first is the impact of malaria on foreign direct investment and tourism. Malaria, unlike diseases resulting from poverty, does not discriminate between rich and poor victims. As long as malaria protection is imperfect and cumbersome, well-to-do foreign investors and tourists may stay away from malarial countries. A second channel through which malaria may affect the economy is limitation on internal movement, Leighton et al. (1993).

The better educated and the ambitious that move to the largely malaria-free cities lose their natural protection due to lack of exposure. They may be reluctant to maintain contact with the countryside for fear of infection. Communities in unstable malaria areas may try to keep out people from stable malaria areas for fear of epidemics. In general, the transmission of ideas, techniques, and development of transportation systems may all be stunted by malaria.

Finally, the strong correlation of malaria with income levels and income growth may due to a range of tropical vector-borne diseases besides malaria. General health status should be picked up by life expectancy in the income growth regressions, but many tropical diseases, like yellow fever, trypanosomiasis, onchocerciasis, and leishmaniasis, have similar geographical ranges to malaria. Malaria is likely the most important of these diseases, but the measures of malaria used in this study may be an indicator for a combination of tropical diseases. There may be important synergies between the diseases, so that areas affected by multiple tropical diseases are worse off than the sum of the impacts of the individual diseases.

The economic cost of malaria is not limited to the direct costs of treatment. Working when you are seriously ill is very unpleasant. As a result, the sick take time off work (or at least are less productive) and those with sick children take time off to care for them. Time lost per episode varies significantly across settings due to the variability of different types of malaria strains, type of economic activity and access to treatment amongst other factors. The average time lost per adult varies between 1 and 5 days, (Leighton, et al, 1993, Asenso-Okyere, and Janet, 1997). One recent RCT (randomized controlled trial) found that a group of farmers who were assigned bed nets increased their harvest value by 15% Fink et al, (2015) (although Give well have questioned the validity of this result due to baseline imbalances between the treatment and control groups). However, there remains considerable debate as to how much malaria impacts short term productivity. For example, in Malawi, only 52% of adults reported that their illness affected their work. (Ettling, et al, 1994): Moreover, a larger RCT which looked at 81,597 smallholder contract farmers in 1,507 clusters found no significant impact on cotton production from bed net distribution, (Sedlmay, 2014). One possible explanation for this result is that when people are ill they deprioritize less lucrative activities such as basket weaving rather than cotton farming. It seems likely that people who have malaria are less productive in the short term but the scale of this impact is highly uncertain.

2.2 Theoretical Issues

Coping And Struggling Strategies Theory

The actions that focused to contrive the detriment of an event (shock) or a series of actions that menace the well-being of some or totality of household member is called coping strategies. To this end, coping strategies are an attempt to gain control of economic sustainability and viability of the household (Sauerborn et al, 1996). Coping strategies are crucially significant for poor households faced with illness cost shocks, considering the fact that some severe illness can consume a large proportion of household income and budget, therefore needs to mobilize substantial additional income or resource to meet up with treatment of the illness.

Poor household when very often live on a daily wages that is poorly enough to meet minimum requirements can be faced severe situation of having to budget their weekly income on minor illness because the cost of treating minor illness exceeds their daily wages (Russell, 2001). The potency to cope with small illness, extra cost, let alone serious illness is daisy, thus, it is necessary for the livelihood and health of the poor household to be structured in an elastic condition to try to cope by making rational decision with the available options that they have. These decisions might be to borrow or sell their valuables to meet up with the cost of treating the illness. The concept of coping is applicable now to illness cost and either short-term or long-term shock the illness inflict on the household or institution economy (Goudge and Govender, 2000; McIntyre and Thiede, 2003; Russell, 1996; Sauerborn et al, 1996).

Strategies to cope with the direct cost of illness which most times follows the sequence by household ability to minimize the risk to sustainability to livelihood using savings, jewelry, pawning, borrowing or appealing for help on social media, selling available food stuffs, selling unneeded or unproductive assets such as land, machines, livestock or reducing assets is associated with strategies to cope with the illness cost, (McIntyre and Thiede, 2003). Other can be strategies to cope with the indirect cost of an illness. This can come as psychological trauma suffer due to premature mortality due the illness, loss of productive time from illness morbidity, pain associated with the illness, reallocation of work to other household member or workers in the institution, and those household

whose victim of the illness is the head or breadwinners its extremely painful and discomfoting. Thus, the strategies to handle these indirect costs are bedded in coping strategies.

Household capacity to cope with the cost of illness in relation to their strategies and sustainability and affordability of these strategies (McIntyre and Thiede, 2003), is attributed to these two factors. Firstly is vulnerability of the household or household resilience to household assets portfolio's that include financial assets, human capital, physical assets, and intangible social resource (Sauerborn et al, 1996b) secondly is the kind or type of the illness. The duration or severity of an illness cost thus, influencing the coping strategies that the institutions, household, or organization would adopt considering their sustainability and affordability during the short -medium time duration of the illness, the potent framework of four cost of illness stages that requires dynamic types of coping has be formulated by McIntyre and Thiede, (2003).

The more severe and time bad of the illness, the more likely that the household, institutions etc. will feel the cost of the illness both directly and indirectly, this can lead to household to be impoverished, institution loosing productive time and paying for a worker's salary who didn't meet up with his working capacity. Any study of illness or impact of illness that ignore copying strategies might have misleading conclusions (*Chima et al.*, 2003). On one hand, ignoring the effect that illness can have on reduction on food consumption, asset sales, borrowing may underestimate the overall cost of the illness to institutions and household. One the other hand, ignoring reallocation of work, intra-household substitution of labour, or negative productive level or wage loss due to mortality can lead to under-estimation of the indirect cost of the illness.

2.2.2 Health Wages Economic Theory

In Economic theory of malaria burden, two channels affect individuals' income. These, are the role of health over wage rate and the part it plays in the decisions relating to supply of labour and, decisions on how many hours of labour to supply.. According to Alves et al. (2003) healthy individuals, are expected to possess a higher level of human capital, would be more productive than those with poor health. At the household level, where fundamental decisions are made, malaria strip families of their main sources of financial and non-financial resources.

For the affected individuals, the consequences include emotional distress caused by illness and sometimes death. Associated with this is the critical need to care for those infected and to find ways of replacing their contributions to the household and the community. A decrease of labour productivity resulting in loss of income, reduction of savings, and food, reduced support for the elderly; death of adult children, and the growing burden of orphanage is left to the family and concerned friends which finally trickle down to the national economy. This translates into substantial direct, indirect, intangible costs, and life time loss of earnings, all of which determine poverty and welfare status of the households and finally the economy at large.

2.3 Empirical Review

2.3.1 Effect of Malaria on Human Health

Jimoh, A. et al. (2007), in their study used willingness to pay Approach (WTPA) inquiry shows that malaria inflicts huge difficulties on the society as its unpropitious effect is on the physical, mental and social well-being of the people as well as the economic growth of a country. There result revealed that workers (household are determined to pay a minimum of \$41,112 monthly on the average. With a country of over 140 million populations in 2007, this can amount to billions of naira spent yearly on malaria treatment cost. Thus, this can have significant impact on economic growth.

Mc-Cathy (2000), examined the determinant of cross-country differences in malaria morbidity and studied the linkage between malaria and economic growth using classification rule analysis (CRA). The result revealed that there is an influential role of climate in determining cross-country difference in malaria morbidity. Climate controls propose that accessibility to rural health care and income inequality affect malaria morbidity. The research also revealed that higher malaria morbidity significantly affects the growth rate per capital. The research revealed also that growth of malaria impact differs from one country to the other.

2.3.4 Relationship Between Malaria And Labour Productivity

Nnamocha and Agba (2019), studied the impact of malaria on labour productivity in Imo State University Owerri with the main objective of investigating the impact of malaria on labour productivity. The study made use of primary data which was gotten from the use of a well-structured questionnaire. Logit regression analysis malaria burden in Zanzibar. Cross sectional clinical and parasitological surveys were conducted in North a District in May, 2003, 2005 and 2006. Survey data were analyzed using the logistic regression model and adjusted for complex sampling design and potential confounders. Records from all 13 public health care facilities in north A District were analyzed for malaria-related outpatient visits and admissions. Mortality and demographic data were obtained from district Commissioners office. Findings from the research revealed that between 2002 and 2005, crude under five infant (under age 1) and child mortality (aged 1-4) mortality decreased by 52%, 33% and 71% respectively. Similarly, malaria-related admissions, blood transfusion and malaria attributed mortality decreased significantly by 77%, 67% and 75% respectively in children under five. This showed a drastic reduction in the burden of malaria after the introduction of ITNs and ACTs in 2003. The results showed that the MDGs target which is to reduce child mortality and the burden of malaria are achievable in tropical Africa with high coverage combined malaria control interventions.

2. Materials and Methods

Population of The Study

The population of the study comprises of the total Academic and non-academic staff of tertiary institutions in Imo state distributed as follows: Federal University of Technology (FUTO), Owerri = 2126 Imo State University (IMSU), Owerri = 1718 Federal Polytechnic Nekede (FEDPOLY) = 1888

Imo State polytechnic (IMOPOLY) = 1100 Alvan Ikoku Federal college of Education = 2315 These data were gotten from the Personnel Department of Federal University of Technology (FUTO), and Imo state University (IMSU). Data for Federal Polytechnic Nekede (FEDPOLY), Imo state Polytechnic (IMOPOLY), and Alvan Ikoku Federal College of Education (Alvan) were sourced from the Registry Departments of the institutions.

Sample Size Determination

The sample size "n" was obtained using the Taro Yamane's formula viz.: N

$$n = \frac{N}{1 + N(e^2)}$$

Where:

N = population size,

e = level of precision or margin of error (usually 5% or 0.05) Thus given the total population of 9147 staff of tertiary institutions in Imo state and 5% margin of error, we have:

$$n = \frac{9147}{1 + 9147(0.05)^2}$$

$$n = \frac{9147^2}{1 + 9147(0.05)^2}$$

$$n = 383.24 \quad n \sim 383$$

Sources of Data

The study utilized both primary and secondary data. The primary data were obtained from questionnaires which will be used as the primary instrument for data collection. Other primary sources of data include interviews of staff on their work ethics due to malaria sickness and where necessary observation of the researcher was paramount. The questionnaires were circulated among the staff of three selected tertiary institutions in Imo state - Imo state university, Federal University of Technology Owerri and the Federal Polytechnic Nekede.

Proportional Representation

To ensure that we represent the distribution of the questionnaire proportionally and with a very good representation of the population given the sample size, we calculated the percentage of population from different institutions, namely Federal University of Technology (FUTO) Owerri, Imo State University (IMSU) Owerri, Federal Polytechnic

Nekede (FEDPOLY), Imo State Polytechnic (IMOPLOY), and Alvan Ikoku Federal College of Education (ALVAN).

According to the data available given the sample size,

To get the actual percentage that perfectly represent our population proportionally, we calculate the percentage of the population that represent the sample size.

Total staff = 9147

FUTO = 2126

IMSU = 1718

FEDPOLY = 1888

IMOPOLY-1100 and

ALVAN = 2315

FUTO = $2126 \times 100 / 9147 = 212600 / 9147 = 23.24\% = (2126 / 9147 \times 383) = 89$ IMSU = $1718 \times 100 / 9147 = 171800 / 9147 = 18.78\% = (1718 / 9147 \times 383) = 72$

FEDPOLY = $1888 \times 100 / 9147 = 188800 / 9147 = 20.64\% = (1888 / 9147 \times 383) = 79$

IMOPOL Y = $1100 \times 100 / 9147 = 110000 / 9147 = 12.03\% = (1100 / 9147 \times 383) = 46$

ALVAN = $2315 \times 100 / 9147 = 231500 / 9147 = 25.31\% = (2315 / 9147 \times 383) = 97$

Model Specification

The model examined the impact of malaria on labour productivity in tertiary institutions in Imo state. The model to be specified is believed to be a take-off from emerging models in Economic literature on the nexus between malaria and labour productivity in Nigeria. Sequel to this, we adopted the model of Fallahi, Sojoodi & Aslaninia (2010) who specified labour productivity as a function of education, wage, fixed capital per employee, export orientation and R&D activities of labour force in Iran. Their model, however, utilized secondary data and is not domiciled in Nigeria. Among the related models from research works carried out in Nigeria is the model of Egbetokun, Omonona & Oluyole (2014) who in their study of sickness and labour Productivity among Cocoa Farmers in Ogun State specified linear regression model involving variables such as type of toilet used by the farmers, distance of toilet from homestead, diversification extent of food consumed, working hours per day and number of sick days during cropping season.

Alternately Nnamocha and Agba (2019), studied the malaria and labour productivity in Imo state University, Owerri, in their model, they specified a logit regression model involving variables such as workers willingness to report to work due to malaria infestation, the employment variation (academic and non-academic staffs) of workers' ability to report to work upon being diagnosed of malaria, work efficiency of an average worker due to malaria infestation, working capacity of workers ability to work due to malaria, and the probable loss in income due to malaria incidence and how these variables affects labour productivity.

We modified Nnamocha and Agba (2019) model by introducing the following variables, Health seeking behaviour, cost of treatment, depletion of workers (mortality), loss of man-hour and working capacity as key malaria-effect-on-labour indices as the explanatory variables or factors while labour productivity (measured by the 4-point rating scale) is the dependent variable. The model can be expressed in implicit form as:

$$\text{Lab_Prod} = f(\text{DOW}, \text{LMH}, \text{WCM}) \dots (3.1)$$

Where:

Lab Prod = Labour productivity

HSB = Health Seeking Behavior of the workers

LMH - Lost Man Hour due to malaria sickness

WCM = Working Capacity of the workers due to malaria

The model can be stated in an econometric form as follows:

$$\text{Lab_Prod} = \alpha_0 + \alpha_1 \text{DOW} + \alpha_2 \text{LMH} + \alpha_3 \text{WCM} + u \dots (3.2)$$

Where $\alpha_1 - \alpha_3$ represent the unknown coefficients of the model to be estimated, α_0 is the

intercept of the model while " μ " is the stochastic error term.

Descriptions/Justification of the Variables

Labour Productivity (Lab-Prod): Labour productivity refers to the output of workers given the absence of every form of ailment or impediment. In the context of this study, labour productivity measures the rate at which workers or employees in tertiary institutions carry out their primary duty of imparting knowledge to undergraduates and every other sundry duty without experiencing breakdown or health challenges. One of the ailments that usually affect workers is malaria hence output of the lecturers and workers are deemed to be dependent on their health status (malaria).

Man-Hour Loss due to Malaria: Man hour loss is referred to loss of productive time by workers when they are suffering from an ailment. This loss of productive time to malaria is captured in malaria morbidity. These variable captured days loss, reallocation of work in the institutions to workers that are free from malaria, care-given time spent by the workers to other family members who is sick with malaria, time lost to sick leave by the workers and replacement of workers that can't work due to malaria infestation. Thus, this variable captures the above man-hour loss and its impact on labour productivity of workers in tertiary institutions in Imo state.

Depletion of Workers (Mortality due to Malaria): Mortality due to malaria is refers to premature depletion of active workforce. Death from malaria infestation causes reduction of workforce strength, psychological effect to the colleagues of the death worker, time to attend internment of the worker by his colleagues, and replacing experience colleague that died. This variable captured the above factors caused by malaria mortality in the tertiary institutions in Imo State and its impact on labour productivity due to malaria

Working Capacity of workers due to Malaria: Working capacity refer to the quality/amount of work that workers can perform or the total volume of work that workers can do given his human capital or training. This variable captures the ability of workers to report to work when they are suffering from malaria, the volume of work that the worker can do when his is sick etc. Thus, the variable captured the above factors caused by malaria and how they affect labour productivity in tertiary institutions in Imo State.

3. Results and Discussion

Data presentation and analyses

4.1 Data Presentation

From the sample size which is three hundred and eighty three (383). The structured questionnaires was distributed to the five (5) tertiary institutions in Imo State Proportionally as calculated in our chapter three (see proportional representation). From the 383 questionnaires distributed, three hundred and forty eight (348) were properly filled and returned. Thus, this analysis will be done using 348 as our new sample size which represents the total population of staff in the five tertiary institutions in Imo State that received, filled and returned the questionnaires that was given to them.

The cumulative responses from the questionnaires are presented under this section[^] The weighted mean are also computed and compared with the criterion mean as obtained in the previous chapter. The end remark is made and preliminary conclusion is drawn from the results. The data are presented as follows:

The Table 4.1.1 above summarizes the responses on the labour productivity of the workers in the tertiary institutions in Imo state

S/N	LABOUR PRODUCTIVITY	SA	A	DA	SD	MEAN(X)	REMARK
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1.	My efficiency is reduced whenever I am diagnosed of malaria.	130	142	40	36	2.777	Positive
2	I have been awarded formally for my efficiency and meritorious service at work.	119	150	32	47	2.71	Positive
3	There is improved efficiency at work when my family members are malaria free.	168	136	23	21	2.99	Positive
4	The money I spend on treating malaria makes me to be less motivated and decreases my labour output.	90	133	97	28	2.56	Positive
5	The health insurance package of my institution increases my chances of getting quality treatment from malaria hence increasing my labour output.	98	127	87	36	2.57	Positive
6	Incidence of malaria in my work place increases my labour output.	87	66	103	92	2.20	Negative
7	I suffer from malaria at least ones in a month and this reduces my productivity.	118	139	54	37	2.70	Positive
8	The after effect of malaria decreases my productivity for weeks.	76	174	77	21	2.61	Positive
9	Immunity to malaria enhances my productivity.	125	115	67	41	2.66	Positive
10	Labour productivity in tertiary institutions is on the increase despite the increasing scourge of malaria in the country.	54	137	95	62	2.30	Negative
	Grand Mean					26.08	

Source: Field Survey (2024) ** decision arrived at based on 2.5 criterion mean

Item 1 My efficiency is reduced whenever I am diagnosed of malaria. From the table above, the total numbers of staff that strongly Agreed (S A) and Agreed (A) to the questions as regard to their efficiency based on the question above are 130 and 142 respectively while 40 and 26 staff Disagreed and Strongly Disagreed respectively. The calculated mean for this question is revealed to be 2.77 which is greater than the criterion mean value of 2.5. This shows that question is positive, and we conclude that the efficiency of workers in the tertiary institutions in Imo State are reduced whenever they are diagnosed of malaria

Item 2: I have been awarded formally for my efficiency and meritorious service at work. This question is designed to capture the commitment of workers to the work when they are free from malaria infection. From the results it revealed that the sampled populations are committed staff given their responses to the question. The table above revealed that 119 and 150 of the respondents strongly agreed and Agreed respectively, while 32 and 47 of the respondents Disagreed and Strongly Disagreed. The calculated mean value is 2.71 which are greater than the criterion mean of 2.5. Thus, this show that

the response to the question is positive and we conclude that the sampled populations are committed staffs in their respective tertiary institutions in Imo state.

Item 3: There is improved efficiency at work when my family members are malaria free. From the table above, 168 and 136 of the total sampled populations Strongly Agreed and Agreed respectively while 32 and 47 of the respondent Disagreed and Strongly Disagreed respectively. This question revealed how the working efficiency (productivity) of staffs when their family members are malaria free. From the table above the calculated mean value are 2.99 which are greater than the criterion mean of 2.5. This shows that the responses of the respondents to the question are positive. Thus, we conclude that the efficiency, concentration, dedication and productivity of the staff in tertiary institution in Imo state at work improve when their family members are malaria free.

Item 4: The money I spend on treating malaria makes me to be less motivated and decreases my labour output. From the table above, the total respondents that Strongly Agreed and Agreed are 90 and 133 respectively while 97 and 28 of the total respondents Disagreed and Strongly Disagreed to the question respectively, The calculated mean as showed in the labour productivity table above revealed the value to be 2.56 which is greater than the criterion mean of 2.5. This shows that the question is positive. Thus, we conclude that money spend on malaria treatment by the workers in tertiary institution in Imo state affect their labour productivity or labour output.

Item 5: The health insurance package of my institution increases my chances of getting quality treatment from malaria hence increasing my labour output. From the responses as revealed in the table above, 98 and 127 of the respondents Strongly Agreed and Agreed respectively while 87 and 36 of the total respondents Disagreed and Strongly Disagreed respectively. The calculated mean value as shown in the table is 2.57 which is greater than the criterion mean of 2.5. This shows that the question is positive in influencing workers labour output in the tertiary institutions in Imo state. Thus, we conclude that health insurance package in tertiary institution in Imo state increases the chances of staff getting quality treatment from malaria hence increase their labour output or productivity.

Item 6: Incidence of malaria in my work place increases my labour output. From the table above, 87 and 66 of the total respondents that from the returned questionnaire Strongly Agreed and Agreed to the question, while 103 and 92 of the respondents Disagreed and Strongly Disagreed to the question. The calculated mean value is 2.20 which is less than 2.5. This shows that the question is negative. Thus, we conclude that incidence of malaria at work place in the tertiary institutions in Imo state does not increase labour output.

Item 7: I suffer from malaria at least ones in a month and this reduces my productivity. This question tries to determine the least possible time our population which is duly represented by our sample size suffers from malaria infestation and how this vector affects their productivity. From the table above, 118 and 139 of the respondents Strongly Agreed and Agreed to the question, while 54 and 37 of the respondents Disagreed and Strongly Disagreed to the question. From the labour productivity table, the calculated mean value is 2.70 which are greater than the criterion mean of 2.5. Thus, we conclude that from the result above, workers/staff of tertiary institutions in Imo state suffers malaria at least ones in a month and this reduces their productivity.

Item 8: The after effect of malaria decreases my productivity for weeks. The question above looks at the aftermath of malaria infestation in relation to workers' productivity in the tertiary institutions in Imo state. From the above, 76 and 174 of the respondents Strongly Agreed, and Agreed while 77 and 21 of the respondents Disagreed and Strongly Disagreed. The calculated mean value for these responses is 2.61 which are greater than criterion mean of 2.5. This shows that the question is positive in determining the productivity of staff in the five tertiary institutions in Imo State. Thus, we conclude that the after effect of malaria decreases the productivity of staff in the tertiary institutions in Imo state.

Item 9: Immunity to malaria enhances my productivity. The questions try to look at immunity from malaria. From our literature, there are some blood group that is prone to

malaria and there are some that hardly contact the parasite, also, immunity can also come inform of having good knowledge of malaria and trying to reduce the chances of contacting the parasite at all cost. Thus this question deals with how this immunity enhances productivity of workers in the tertiary institution in Imo state. From the table above, 125 and 115 of the respondent Strongly Agreed and Agreed while 67 and 41 Disagreed and Strongly Disagreed respectively. The calculated mean value is 2.66 which are greater than criterion mean of 2.5. This shows that the question is positive in determining the productivity of workers in tertiary institutions in Imo state. Thus, we conclude that immunity to malaria enhances productivity of staff in tertiary institutions in Imo state.

Item 10. Labour productivity in tertiary institutions is on the increase despite the increasing scourge of malaria in the country. From the table, 54 and 137 of the respondents Strongly Agreed and Agreed respectively while 95 and 26 of the respondents Disagreed and Strongly Disagreed. The calculated mean value as revealed in the table above is 2.30 which is less than the criterion mean of 2.5. This shows that the question is negative from the responses of the respondents. It reveals that increasing malaria scourge in the country is affecting the labour productivity of tertiary institutions through its negative externality. Thus, we conclude that increasing malaria scourge in the country affect labour productivity in tertiary institutions in Imo state.

Table 4.1.2: Depletion of Workforce (Mortality Rate)

	DEPLETION OF WORKERS DUE TO MALARIA (MORTALITY)	SA	A	DA	SD	Mean (x)	Remark
11	Loss of colleagues due to malaria affect my productivity	84	150	77	37	2.55	Positive
12	The psychological effect of loss of colleague makes to lose concentration at work and achieve less daily	69	162	68	49	2.47	Negative
13	The time lost to attending internment of colleague who died due to malaria affects working hour productivity	93	147	82	26	2.62	Positive
14	It is very difficult to replace an experienced colleague who died to malaria	105	117	71	55	2.53	Positive
15	The strength of the workforce in my institution is affected by mortality rate of colleague due to malaria	75	120	91	52	2.33	Negative
	Grand mean					12.50	

Source: Field Survey (2024) **decision arrived t based on 2.5

Item 11: Loss of colleagues due to malaria affects my productivity. From the table 4.1.4 above, 84 respondents Strongly Agreed, 150 Agreed, 77 Disagreed and 37 Strongly Disagreed to the question. The calculated mean response is 2.55 which are above the criterion mean of 2.5. This shows that the question is positive. Thus we conclude that loss of a colleague due to malaria affect the productivity of staffs in tertiary institutions in Imo state.

Item 12: The psychological effect of loss of colleagues makes me to lose concentration at work and achieve less daily. From the table above, 69 and 162 respondents Strongly Agreed and Agreed to the question respectively while 68 and 49 respondents Disagreed and Strongly Disagreed respectively. The calculated mean response value is 2.47 which is

less than the criterion mean of 2.5. This shows that the question is negative. Thus, we conclude that the psychological effect of loss of a colleague due to malaria do not make the staff neither lose concentration nor achieve less daily.

Item 13: The time lost to attending internment of colleagues who died due to malaria affect my working hour productivity. From the above table, 93 respondents Strongly Agreed to the question, 147 Agreed, 82 Disagreed, while 26 Strongly Disagreed. The calculated mean response value is revealed to be 2.62 which are greater than the criterion mean of 2.5. This shows that the question is positive. Thus, we conclude that the time lost to attaining internment of colleagues who died due to malaria affects working hour productivity of staffs in tertiary institutions in Imo state.

Item 14: It is very difficult to replace an experienced colleague who died due to malaria. The above table revealed that 105 respondents Strongly Agreed to the question, 117 Agreed, 71 Disagreed while 55 Strongly Disagreed. The calculated mean response value is revealed to be 2.53 which are greater than 2.5 criterion likert mean. This shows that the question is positive. Thus, we conclude that it is very difficult to replace an experienced colleague who died due to malaria.

Item 15: The strength of the workforce in my institution is affected by mortality rate of colleagues due to malaria. From the table above, 75 respondents Strongly Agreed to the question, 120 Agreed, 91 Disagreed while 52 Strongly Disagreed, The calculated mean responses stood at 2.33 which is less than the criterion mean of 2.5. This shows that the response is negative. Thus, we conclude that the strength of the workforce in the tertiary institutions in Imo state is not affect by the mortality rate of staffs due to malaria.

Table 4.1.5: Loss of Man-hour

	MAN-HOUR LOST DUE TO MALARIA (X4)	SA	A	DA	SD	Mean (x)	Remark
16	Days lost while treating malaria affect productivity at my workplace	126	159	44	19	2.84	Positive
17	Re-allocation of duties to malaria-free colleagues enhances productivity	69	129	92	58	2.36	Negative
18	Care-given time to family member by the worker encourages absenteeism and reduces productivity	60	177	74	37	2.50	Positive
19	When diagnosed of malaria, I am easily replaced by a colleague to ensure efficiency	66	102	98	82	2.21	Negative
20	The time spent on sick leave due to malaria decreases workers' productivity	93	159	67	29	2.64	Positive
	Grand Mean					12.56	

Source: Field Survey (2024) **decision arrived at based on 2.5 criterion

Item 16: Days lost while treating malaria affects productivity at my work place. From table 4.1.2 above, 126 respondents Strongly Agreed to the question, 159 Agreed, 44 Disagreed while 19 Strongly Disagreed. The calculated mean response value is 2.84 which are greater than the criterion mean of 2.5. This shows that the question is positive to determining the productivity level of the staffs in tertiary institutions in malaria in respect to time lost while treating malaria.

Item 17: Re-allocation of duties to malaria free colleagues enhances productivity. The table above, 69 respondents Strongly Agreed to the question, 129 Agreed, 92 Disagreed while 58 Strongly Disagreed. The calculated mean response value is 2.36 which is less than the

criterion mean of 2.5. This shows that the question is negative. Thus, we conclude that re-allocation of duties to malaria free colleagues does not enhance productivity in the tertiary institutions in Imo state. This conclusion means that a sick staff that is replaced by his colleague is more productive. This is because human capital is not transferrable at that point.

Item 18: Care-given time to family member by the worker encourages absenteeism and reduces productivity. The table above revealed that 60 respondents Strongly Agreed to the question, 177 Agreed, 74 Disagreed while 37 Strongly Disagreed. The calculated mean response value is 2.50 which are equal to the criterion mean of 2.5. This revealed that the question is positive. Thus we conclude that the care-given time to family member by the staffs of tertiary institutions in Imo state encourages absenteeism and reduces their productivity.

Item 19: When diagnosed of malaria, I am easily replaced by a colleague to ensure efficiency. The table 4.1.2 above showed that 66 respondents Strongly Agreed, 102 Agreed, 98 Disagreed, while 82 Strongly Disagreed. The calculated mean responses value is 2.21 which is less than the criterion mean of 2.5. This shows that the responses are negative. We conclude that the staffs of tertiary institutions in Imo state are not easily replaced when they are diagnosed with malaria. This result shows that the productivity of the staffs will be negative when he is diagnosed and absent from work.

Item 20: The time spent on sick leave due to malaria decreases workers' productivity. The table 4.1.2 above revealed that 93 respondents Strongly Agreed to the question, 159 Agreed, 67 Disagreed while 29 Strongly Disagreed. The calculated mean response value is revealed to be 2.64 which are greater than the criterion mean of 2.5. This shows that the question is positive in determining the productivity of staffs via man-hour lost. Thus, we conclude that the time spent on sick leave due to malaria decreases the productivity of staffs of tertiary institutions in Imo state.

Table 4.1.3: Working Capacity

	WORKING CAPACITY DUE TO MALARIA (X5)	SA	A	DA	SD	Mean (x)	Remark
21	My inability to report to work due to malaria reduces my work capacity	96	162	76	14	2.70	Positive
22	I go to work despite feeling sins of malaria	30	207	66	45	2.40	Negative
23	The volume of work is not the same when I am diagnosed of malaria	123	122	52	51	2.64	Positive
24	Ability to work due to malaria affects my productivity	75	195	54	24	2.66	Positive
25	I put in more efforts in my day job even when I am diagnosed with malaria	54	105	90	99	2.11	Negative
	Grand Mean					12.52	

Source: Field Survey (2024) **decision arrived at based on 2.5 criterion mean

Item 21: My inability to report to work due to malaria reduces my work capacity. The table 4.1.3 above revealed that 96 respondents Strongly Agreed to the question, 162 Agreed, 76 Disagreed, while 14 Strongly Disagreed. The calculated mean response value is 2.70 which is greater than the criterion mean of 2.5. This shows that the question is positive. Thus, we conclude that inability to report to work due to malaria reduces the working capacities of staffs in tertiary institutions in Imo state.

Item 22: I go to work despite feeling signs of malaria. The table above shows that 30 of the respondents strongly agreed to the question, 207 Agreed, 66 Disagreed while 45 Strongly Disagreed. The calculated mean response value is 2.40 which is, less than the criterion mean of 2.5. This shows that the question is negative. We conclude that despite feeling the signs of malaria, workers in the tertiary institutions in Imo go to work.

Item 23: The volume of work is not the same when I am diagnosed of malaria. The table above revealed that 123 respondents Strongly Agreed, 122 Agreed, 52 Disagreed while 51 Strongly Disagreed. The calculated mean response is 2.64 which are greater than the criterion mean of 2.5. This shows that the question is positive. We conclude that the volume of work is not the same when the staffs are diagnosed of malaria in tertiary institutions in Imo state.

Item 24: Ability to work due to malaria affects my productivity. The table above shows that 75 respondent Strongly Agreed to the question, 195 Agreed, 54 Disagreed while 24 Strongly Disagreed. The calculated mean response value is 2.66 which are greater than the criterion mean of 2.5. This shows that the question is positive. Thus, we conclude that the ability to work due to malaria affects the productivity in the tertiary institutions in Imo state.

Item 25: I put in more effort in my job even when I am diagnosed with malaria. The table above revealed that 54 respondent Strongly Agreed to the question, 105 Agreed, 90 Disagreed while 99 Strongly Disagreed. The calculated mean response value is 2.11 which is less than the criterion mean of 2.5. This shows that the question is negative given the responses. We conclude that the efforts that staffs in tertiary institutions in Imo state put in during their days job is reduced when they are diagnosed of malaria.

4.2 Presentation Of Empirical Result And Interpretation

Table: 4.2.2 Ordinary Least Square Estimate Result

Variable	Coefficient	Std. error	T- test	P-value
C	0.278	0.278	0.041	0.968
DOW	0.017	0.081	0.207	0.836
LMH	-0.046	0.013	-3.538	0.045
WCM	0.250	0.092	2.706	0.007

Source: Author's Computation Dec, 2024

$R^2 = 0.785$ F. Sat. =2.450 F.stat. P-Value = 0.034

ADJ $R^2 = 0.720$ D.W Stat = 2.002

4.2.2 Presentation Of Ordinary Least Square Result.

From the ordinary least square estimate, the following results were obtained.

Depletion of Workers Due To Malaria (Mortality) (DOW) (0.017): The explanatory variable depletion of workers due to malaria (mortality) (DOW) is found to be positive, given its positive coefficient. This result showed that mortality due to malaria affects labour productivity in tertiary institutions in Imo state. This is evident in the mean response of the sampled population, it revealed that mortality due to malaria affects labour productivity of workers in question (21), attending of internment of a colleagues who died due to malaria affect working hour productivity (question (23)), and replacement of an experience colleague who died due to malaria is difficult thereby affecting the human capital stock (question (24)). Also the ordinary least square estimate revealed that it' statistically insignificant given the probability value or significance level of 0.836 which is greater than 0.05% level of significance. This insignificant nature of the explanatory variable is credited to the responses of the sampled population in question (22) which revealed that they psychological effect of loss colleague do not last long nor affect the concentration of workers in discharging their duties. Also the result being insignificant also shows that mortality due to malaria is not a regular occurrence in the tertiary institutions given the good knowledge of malaria and its means of prevention and treatment (question 25). Thus, we conclude that depletion of worker due to malaria

(mortality) positively affect labour productivity in tertiary institutions in Imo state. This finding supports the findings of Bello (2005) and Soares (2009).

Man-Hour Loss Due to malaria (LMH) = (-0.046): The explanatory variable (LMH) is found to be negative given its negative coefficient. This shows that loss of man-hour due to malaria do not affect labour productivity in the tertiary institutions in Imo state, although it's found to be statistically significant given the significance value of 0.045 which is less than 0.05 level of significance. Loss of man-hour due to malaria result is evident in the mean responses of the sampled population in question (27) which revealed that re-allocation of duties to malaria free colleagues does not enhance productivity in tertiary institutions in Imo State, also question (29) revealed that workers in tertiary institutions are not easily replaced when they are diagnosed of malaria. Alternatively, the Nigerian system of productivity measure is not done per hour but per month. Thus, the result reflects the true nature of the impact of loss of man-hour due to malaria on labour productivity. Considering that the OLS result revealed Loss of man-hour due to malaria to be significant, question (26) mean response showed that days lost while treating malaria affects the productivity of workers in tertiary institution, question (28) revealed that care-given time to family member by the workers encourages absenteeism and reduces productivity, also question (30) affirmed that loss of man-hour due to malaria is significant on labour productivity by confirming that the time spent on sick leave due to malaria decreases workers' productivity. Thus, we conclude by saying that loss of man-hour due to malaria does not affect labour productivity in tertiary institutions in Imo state but it's found to be significant. The result is in line with the works of Eboh and okeibunor (2003), Mc-Catty (2000) and Onwujekwe et al. (2000).

Working Capacity Due To Malaria (WCM) (0.0250): The explanatory variable working capacity due to malaria is found to be positive, given its positive coefficient. The ordinary least square estimate found working capacity due to malaria to be statistically significant given the significant value or probability value of 0.007 which is less than 0.05. This result showed that working capacity of workers due to malaria in tertiary institutions in Imo state is positively and significantly affects their output, efficiency and labour productivity. This result is also confirmed in the mean response of the respondents in question (31) which revealed that workers inability to report to work due to malaria reduces their working capacity, question (33) mean responses revealed that the volume of work is not the same when workers are diagnosed of malaria and the finally question (34) rounded the positive and significant impact of malaria on working capacity by confirming that malaria affect workers ability to work which affect their output, efficiency and labour productivity. This finding is in line with the findings of Nnamocha and Agba (2019), Eboh and okeibunor (2003) and Egbotokun, Omonona and Oluyole (2014).

Discussion Of Findings

The study on the impact of malaria on labour productivity with our scope on the tertiary institutions in Imo made the following findings Having distributed the questionnaires proportionally given our sample size of 383, a total of 348 questionnaires were properly filled and returned. This changed our working sample size to 348. The researcher calculated that mean response to no how each question faired in respect to the likert distributed structure questionnaires to the targeted population which is the staffs of tertiary institutions in Imo state. The study revealed that questions 1, 2, 3, 4, 5, 7, 8, 9 were shown to be positive in determining the productivity level of the workers in tertiary institutions in Imo state given that their mean responses are greater than the likert criterion mean of 2.5 while questions 6 and 10 were found to be negative. The questions designed to capture the health seeking behaviour of workers due to malaria on labour productivity revealed that questions 11, 12 are positive while question 13, 14, 15 are found to be negative. The questions for the cost of malaria treatment revealed that questions 18 and 20 are found to be positive while questions 16, 17, and 19 negative. The question structured to captured that impact of depletion of workers due to malaria (mortality) and how it affect labour productivity revealed that questions 21, 23 and 24 are positive while

questions 22 and 25 are found to be negative. The questions designed to capture the impact on loss of man-hour showed that questions 26, 28, and 30 are positive while questions 27 and 29 are negative given their mean response. Alternatively, the explanatory variable working capacity of worker due to malaria revealed that questions 31, 33 and 34 are found to be positive while questions 32 and 35 are shown to be negative in its influence on labour productivity.

The reliability test of the instrument was carried out using the cronbach Alpha reliability test using 100 returned questionnaire. The test was found to be GOOD given its value of 0.856.

The ordinary least square estimate was used to capture that impact or linear relationship between those explanatory variables (HSB, COT, DOW, LMH and WCM) and the dependent variable (LAB-PROD). The result revealed that health seeking behaviour (HSB), Depletion of workers due to malaria (DOW), and working capacity of worker due to malaria (WCM) have positive impact on Labour productivity of workers in tertiary institutions in Imo state while Cost of malaria treatment (COT) and loss of man-hour (LMH) have negative relationship with labour productivity of workers in tertiary institutions in Imo state.

In testing of hypotheses, based on the significance level of these explanatory variables, the OLS result revealed that cost of malaria treatment (COT), Loss of Man-Hour due to malaria and Working capacity of workers due to malaria are found to be significant given their sig values which are less than 0.05, thereby making us to reject their null hypotheses and accept their alternative hypotheses. While explanatory variable like health seeking behaviour (HSB) due to malaria and Depletion of worker (mortality) due to malaria are found to be insignificant on the dependent variables labour productivity given their sig values which are greater than 0.05, thereby making us to accept the null hypothesis and rejecting the alternative hypotheses.

The F-statistics value is found to be positive with its value as 2.450. The ordinary least square also found the F-statistics to be statistically significant given the probability value of 0.034 which is less than 0.5. This shows that the explanatory variables jointly affect the dependent variable positively.

The adjusted R^2 is revealed to be 0.72 (72%) this shows that the model is a robust and also the model has a good fit.

The Durbin Watson statistics is revealed to be 2.002 which show that there is no presence of autocorrelation in the model.

Finally, the malaria incidence per 1000 worker and the report death due to malaria in Nigeria confirms our results that malaria truly affects labour productivity in Nigeria.

4. Conclusion

Having studied the impact of malaria on labour productivity in Nigeria, a study of tertiary institutions in Imo state, the model revealed that the explanatory variables Depletion of workers (mortality) due to malaria, Loss of man-hour due to malaria, working capacity of workers due to malaria jointly affects labour productivity in tertiary institutions in Imo state.

5.3 Recommendations

Based on the findings, the following recommendations were made:

1. Malaria has being found in this study to be potent in reducing labour efficiency, output and productivity, Nigerian government through its ministry of education initiate policy and programmes that will build a good hospital in every institutions of higher learning to enable staffs, staffs children, students and any biological relations of staffs to have a quality medical care at a reduced cost. This will help enhance the productivity of the staffs in tertiary institutions in the country.
2. There should be state on emergency over the increasing malaria scourge in Nigeria. This will help to keep the mindset of Nigerians on red alert on the need to clean up their

environments to enable a speedy eradication of stagnant water, crevices, clearing of bushes, etc. to discourage the breeding of mosquitoes in their surroundings. It will help in improving the working capacities of tertiary education workers.

3. Having studied the impact of malaria on labour productivity, and it revealed that malaria is significant in reducing the man-hour of workers, it's necessary to ensure that our environment is well fumigated. This will reduce the risk of working population getting infected with malaria and also reduce the man-hour lost due to malaria. If the man-hour loss to malaria is reduced to its minimum, productivity will be encouraged or improved

Contribution To Knowledge

1. This study impact of malaria on labour productivity in Nigeria to the best of my knowledge is the first of its kind in economic literature to utilized four point likert scale in its cross-sectional analysis. This study provides a strong theoretical and empirical background to further researchers to explore fields in economic research.

2. The work has been able to provide a rating scale to measure workers' productivity based on four (4) point scales. It is believe that this scale having been reliable and valid can also be applied to ascertain the productivity of workers in any sector in Nigeria economy.

3. The formulated model for this research provide a strong foundation for further researchers to expand the horizon for issues, factors and variables that affect labour output, efficiency and productivity.

4. Our finding empirically showed that our model is potent in determining the productivity of workers in tertiary institutions in Imo state and Nigeria at large.

REFERENCES

1. Alves L.F, M.V. Andrade & P.B.R. Mecedo (2003). "Health and Labour Market in Brazil Mimeograph".
2. Agba Ugochukwu Pascal (2014) Impact of Human Capital Development on the Growth and development of Nigeria Economy. West African Journal of Business and Management sciences. Vol, 3, Issue 2A, Pages 170-182. Siren Publishers
3. Asensio-Okyere and J.M. Asante-Addo (1997): "Household Consumption Patterns and Poverty in Ghana."In Poverty Reduction Strategies in Africa, edited by T. Addiscott and J. M Asante-Addo, 135-153. Accra: Ghana Universities Press.
4. Chima R.I., Goodman C.A., Mills A. (2003). "The Economic Impact of Malaria In Africa. A Critical Review of the Evidence". Health Policy 63(1): 17-36.
5. Eboh E.C. & Okeibunor J.C. (2005). "Malaria prevalence and impact on farm household labor use and productivity in the irrigated rice production system in Omor community, Nigeria". Tanzania Health Research Bulletin. Vol. 7 Nol.
6. Egbetokun O.A., Omonona, B.T. & Oluyole K.A. (2014). "Economic Analysis of Sickness and Labour Productivity among Cocoa Farmers in Obafemi/Owode Local Government Area, Ogun State". Journal of Biology, Agriculture and Healthcare. Vol A, No.20.
7. Ettlign M.B., McFarland D.A., Schultz L.J., Chitsulo L. (1994). "Economic Impact Of Malaria in Malawin Households". Tropical Medicine and Parasitology. 45(1): 74-79..
8. Ettlign M.B., Shepard D.S. (1991). "Economic Cost of Malaria in Rwanda". Tropical medicine and Parasitology 42(3): 214-218.
9. Fink T, Rangika U. H (2015): Factor affecting Labour Productivity: An Integrative synthesis and productivity modeling. Global Business and Economics Review
10. Fallahi F. & Sojoodi S. andAslaninia N.M. (2010). "Determinants of labor productivity in manufacturing firms of Iran: Emphasizing on labor education and training. MPRA Paper No. 27699, <http://mpra.ub.uni-muenchen.de/27699/>.
11. Gallup, J.L., Sachs J.D. (2001). "The Economic Burden of Malaria". America Journal of Tropical medicine and Hygiene 64(1-2 suppl): 85-96.
12. Goudge J., Govender V. (2000). "A review of experience concerning household ability to cope with the resource demands of ill health and health care utilization". EQUINET Policy Series No. 3. Centre for Health Policy, University of the Witwaters and Health Economics Unit, University of Cape Town.
13. Jimoh A. (2004). "The Economic Burden of Malaria: Evidence from Nigeria- Cost of illness Approach". WHO Technical report.

14. Jimoh A., Sofola O., Petu A., & T. Okorosobo (2007). "Quantifying the Economic Burden Of Malaria in Nigeria Using the Willingness To Pay Approach. Cost Effectiveness and Resource Allocation". Biomed central Ltd. Vol 5(6).pp. 17.
15. Kanenechukwu Obioma Bennett, Pascal Agba Ugochukwu & Onyeneho Edwim (2024) Labour Economics. Second Edition: ISBN: 978-35077-7-X, Proofield Media LTD
16. Leighton C, Foster R. (1993). "Economic Impact of Malaria in Kenya and Nigeria". Bethesda, MD, Abt Associate.
17. McCarthy F.D., Wolf H., Wu. Y. (2000). "The Growth Cost of Malaria". Working Paper No 7541. Cambridge. National Bureau of Economic Research (NBER).
18. Nnamocha P.N. & Agba U.P. (2019). "Malaria and Labour Productivity.A survey of Imo state of Nigeria. Journal of the national association of social educators, Vol.4, Issues 4, ISSN:119-9512. Department of Economics, Imo State university, Owerri
19. National Malaria Control Programme Report (2011). "Focus on Nigeria. Progress and Impact Series. Available at www.google.com.
20. Onwujekwe, O., Malikel, P., Mustafa, S.I.I., Mnzavaa, A. (2006). "Do malaria preventive Interventions reach the poor? Socioeconomic inequities in expenditure on and us of Mosquito control tools in Sudan". Health Policy Plan, 21(1), 10-6.
21. Pascal Ugochukwu Agba and Robert okechukwu Dum (2016): Development Economics. Vol 2, Kricle Publishers
22. Sachs J., Malaney P. (2002). "The Economic and Social Burden Of Malaria". Nature 415 (6872): 680-685.
23. Sedlmayr, Richard (2014). "On The Economic Impact Of Malaria Control, Some Discordant Evidence". January 2014.
24. Sauerborn R., Ibrango I. (1995). "The economic costs of illness for rural households in Burkina Faso". Tropical Medicine Parasitology 46: 54-60.
25. Sauerborn R., Adams A. Hien M. (1996). "Household strategies to cope with the economic costs of illness". Social Science and Medicine 43 (3): 291-301.
26. World Health Organization (2022). World Health Report. Geneva.

CALCULATION RESPONSES FOR LABOUR PRODUCTIVITY

S/N	SA	A	D	SD	TOTAL	
1	130	142	40	36	348	
2	119	150	32	47	348	
3	168	136	23	21	348	
4	90	133	97	28	348	
5	98	127	87	36	348	
6	87	66	103	92	348	
7	118	139	54	37	348	
8	76	174	77	21	348	
9	125	115	67	41	348	
10	54	137	95	62	348	
w1	w2	w3	w4	Total	Mean	
520	426	80	36	1062	2.77	
476	450	64	47	1037	2.71	
672	408	46	21	1147	2.99	
360	399	194	28	981	2.56	
392	381	174	36	983	2.57	
348	198	206	92	844	2.20	
472	417	108	37	1034	2.70	
304	522	154	21	1001	2.61	
500	345	134	41	1020	2.66	
216	411	190	62	879	2.30	
					2.607832898	Average mean
					26.07832898	Grand mean

CALCULATION OF MEAN RESPONSES FOR DEPLETION OF WORKERS DUE TO MALARIA

S/N	SA	A	D	SD	TOTAL
1	84	150	77	37	348

2	69	162	68	49	348
3	93	147	82	26	348
4	105	117	71	55	348
5	75	120	91	52	348

W1	W2	W3	W4	TOTAL	MEAN	
336	450	154	37	977	2.55	
276	486	136	49	947	2.47	
372	441	164	26	1003	2.62	
420	351	142	55	968	2.53	
300	360	182	52	894	2.33	
					2.50	Average Mean
					12.5	Grand Mean

CALCULATION OF RESPONSES FOR MAN HOUR LOSS DUE TO MALARIA

S/N	SA	A	D	SD	TOTAL
1	126	159	44	19	348
2	69	129	92	58	348
3	60	177	74	37	348
4	66	102	98	82	348
5	93	159	67	29	348

W1	W2	W3	W4	TOTAL	MEAN	
504	477	88	19	1088	2.84	
276	387	184	58	905	2.36	
240	531	148	37	956	2.50	
264	306	196	82	846	2.21	
372	477	134	29	1012	2.64	
					2.511	Average Mean
					12.56	Grand Mean

CALCULATION OF MEAN RESPONSES FOR WORKING CAPACITY

S/N	SA	A	D	SD	TOTAL
1	96	162	76	14	348
2	30	207	66	45	348
3	123	122	52	51	348
4	75	195	54	24	348
5	54	105	90	99	348

W1	W2	W3	W4	TOTAL	MEAN	
384	486	152	14	1036	2.7	
120	621	132	45	918	2.40	
492	366	104	51	1013	2.64	
300	585	108	24	1017	2.66	
216	315	180	99	810	2.11	
					2.503	Average Mean
					12.52	Grand Mean