ECONOMIC COSTS OF MALARIA INFECTION AND THEIR IMPLICATIONS ON LABOUR PRODUCTIVITY IN SHINYANGA

MACHIMU JOACHIMU

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER OF SCIENCE IN ECONOMICS OF THE OPEN UNIVERSITY OF TANZANIA

2020

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for the acceptance of the dissertation titled; ñEconomic Costs of Malaria Infection and their Impact on Labour Productivity in Shinyangaò in partial fulfillment of the requirements for the award of the degree of Master of Science in Economics of the Open University of Tanzania.

é é é é é é é é é é é é ..

Prof. Deus Ngaruko

(Supervisor)

é é é é é é é é .é é

Date

COPYRIGHT

DECLARATION

I, Machimu Joachimu do hereby declare that the whole content of the report is my own original work and that it has not been presented before to any other University for similar or any other award.

é é é é é é é é .é é é ..

Signature

é é é é é é é é é

Date

DEDICATION

This dissertation is dedicated to: My lovely mother Magreth Jeremiah, and my lovely father Henry Machimu. My beloved wife Suzana Kafuje and my dear daughters Hildegarda Joachimu and Holygarda Joachimu. My sister Josephine Machimu and Elizabeth Kyuga and my friend Everson John and Gerald Majaliwa, Elias Mbones, Lusajo Raphael, Rev Emmanuel Makolo, Jeremiah Nsoizaba, Alfred Irangi,Nerbat zakaria,and kenedy Laurian as inspiration for them. Likewise to the memory of my cheerful brother Masatu Julius Malima whose ambitions is to witness my stepping forward academically through his support and supervision. I am grateful for him. Heavenly father bless him abundantly. And to all lovers of knowledge.

ACKNOWLEDGEMENT

I take this opportunity to recognize all those who in one way or another contributed to make my studies successful. First of all, I appreciate the power of the Almight Lord over me, through his endless blessing of strength, wisdom and protection from the start of my studies to date of completion. His name be glorified.

I greatly value the intellectual guidance, comments, patience and constructive criticisms I got from Prof Deus Ngaruko, I am highly indebted to him for his assistance. I also thank my fellow staffs for giving a full support during the period of my studies for taking over my responsibilities which I was required to fulfill.

My special thanks goes to the rest of my family members for motivation, encouragement and their great influence to make me achieve a goal.

ABSTRACT

Provided that Malaria Infection leads to the effect of the household farm productivity, the current study aimed to analyze the economic costs of Malaria Infection to Household Labour Productivity at Tinde Ward - Shinyanga District. The study was justified based on the fact thatboth number of days lost for malaria suffering and household expenditures in terms of treatment and prevention had a significant effect on household farm output.A total of 70 respondents were used to collect the data using descriptivequestionnaire. The data were analysed using both descriptive statistic and multiple regression analysis. The findings from descriptive analysis showed that there were losses of number of days for a week for most of household aged 40 years below. Either they disagree that they have not spent money for household expenditures for treatment and prevention of malaria. Multiple regression analysis showed that the relationships between the variables were weak but significant presented by Adjusted R-square 7.70%. The standard coefficient values showed that an increase in household expenditure for treatment and prevention had a significant increase in farm output by 25.1%. Moreover, every increase in the number of days household family member suffered from malaria infection, had significant and positive change in farm output by 14.4%. It has been recommended that education for malaria prevention is required as malaria infection had found to have relatively economic costs at Jomu Village.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

LIST OF ABBREVIATION

GDP	Gross Domestic Products
HE	Household Expenditure
MI	Malaria Infections
MDGs	Millennium Development Goals
SDGS	Sustainable Development Goal

CHAPTER ONE

INTRODUCTION

1.1 Background Iinformation

Malaria has been linked to the labour productivity of households from the ground that the disease is found to be an economic burden to Africa and one of the great public health problem in Africa (Ricci *et. al.,*2012; Onwujekwe *et.al*., 2013; Shayo, *et.al*., 2014; Alaba and Alaba, (2002). The reaction of the world nations on Epidemic Malaria disease is defined within the United Nation Sustainable Development Goals (SDGs) by 2030 which scaled up the MDGs with the assumption that mitigation of Malaria is linked to eradication of poverty and hunger, reducing child mortality, and improvement of maternal health in developing nations.

Africa had been the leading in the world continental for being reported with high rate of malaria, for instance, WHO report of 2017 showed Africa with high rate of malaria with 92% of malaria deaths occurrence (Shayo, et.al., 2014;Ayale, et.al., 2015). While WHO estimates of the world malaria deaths at 446,000 by 2015 and 4,45,000 by 2016, Africa malaria deaths were 409,000 by the year 2015 and by 2016 the statistics had increased to 4,67,000 by 2016. Moreover, malaria has been reported to undermine women labour output thus leading to household food insecurity provided that women are the core producers of agricultural products in Africa as they make up 60-80% of food crop producers.

Tanzania is reported to invest a lot of effort to achieve its Sustainable Vision by 2025 which aims to achieve high quality livelihood with the society which is free from objective poverty and free from all forms of social constraints. While such

vision prevails, Tanzania is still reported with Malaria being one of the causes for morbidity and mortality. The Voice for Malaria-free-feature, 2018 reported a total of 60,000 malaria outpatient die per year and that 40% of all patients are malaria visit. Despite the efforts by stakeholders, government agencies to fight against Malaria, the problem still exists and thus leading to loss of productivity especially to agricultural producers in the country.

However, Tanzania has been making a lot of efforts to eradicate malaria as follows: a total of 26.4 million nets were distributed in Tanzania since 2010; a total of 445.2 dollars were donated to Tanzania between 2005 to 2016 (Voice of Malaria free future, 2019). Contrary to those efforts the prevalence of Malaria has continued to be an evenly distribution in rural and urban and by level of income. For instance, children aged 6 to 59 months in rural areas reported with malaria prevalence by 18% when compared to 4% children in urban area. Moreover, children in poorest families reported with malaria prevalence by 23% when compared to 1% of children from the rich families.

It is the understanding of different scholars (Roll Back Malaria Partnership, 2015) that with the prevalence of malaria illness especially to agricultural areas like Shinyanga rural areas. The following are likely to happen: reduction in the performance of agricultural production which may lead to national food insecurity, undermining of the labour output and interruption of the production cycle and even the resources will be diverted from the farm input. Therefore, this study is aimed to assess the economic costs of malaria infection to labour productivity among agricultural producers in Shinyanga district in Tinde Ward.

1.2 Statement of the Problem

Malaria Infection is said to have both direct and indirect social-economic household effects and that when it occurs households are likely to loose labour productivity in terms of quality of labour, time value and output produced (Ismail, 2010; Ismail, 2015; Jimoh, *et.al.,* 2007; Sicuri, 2007; Amawulu and Dorothy, 2017; Gunda *et. al.,* 2017; Hennesse *et. al.,* 2012; and Grardin, *et. al.,* 2004). The problem is reported as a serious epidemic disease to Africa and Tanzania as the case study; for instance, Tanzania also reported Malaria being one of the causes for morbidity and mortality, the Voice for Malaria-free-feature 2018) reported a total of 60,000 malaria outpatients die per year.

Moreover, malaria has been reported to undermine women labour output thus leading to household food insecurity provided that women are the core producers of agricultural products in Africa as they make up 60-80% of food crop producers. MI in relation to labor productivity needs further study provided that MI is a complex phenomenon that varies according to climate, geographical space and income level. In that case there are the needs to conduct further study. Therefore the current study analyzed the economic costs of Malaria Infection and their implications to Household Labour Productivity at Tinde Ward-Shinyanga District.

1.3 Research Objectives

1.3. 1 General Objective

The general objective of this study was to analyze the economic costs of Malaria Infection and their implication to Household Labour Productivity at Tinde Ward - Shinyanga District.

1.3.2 Specific Objectives

Specifically, the study done the following:

i. To examine the extent to which Malaria Infections affect labour productivity in terms of householdôs quality of labor invested.
ii. To assess the extent to which delayed working days as the result of Malaria Infections affect labour productivity in terms of householdôs labour output.
iii. To examine the extent to which household expenditure on Malaria Infections affect labour productivity in terms of householdôs labour output.

1.4 Research Hypotheses

H0: There is no significant relationship between delayed working days as the result of Malaria Infection and labour productivity.

H0: There is no significant relationship between household expenditures caused by Malaria infection and households labour output.

1.5 Significance of the Study

There is the need to combat malaria provided that it has a direct effect to decline in labour productivity of the national and the households. The findings therefore established how MI in connection with house expenditure and delayed working hours may lead to decline in labour productivity; thus becoming a reference to policy makers. Moreover, the study is in line with Sustainable Development Goals by 2030 and National Sustainable vision by 2025 which advocated for high quality livelihood from which there are free social constraints. Moreover, at discipline level the study contributed on the concept of MI with home expenditure and delayed work days on decline of labour productivity.

CHAPTER TWO

LITERATURE REVIEW

2.1 Study Overview

The chapter presents the analytical analysis of the literature from which the research gap is identified. The section presents concepts relating to the study to give insight of the topic under study. It further presents the theoretical framework as the guiding lens for the researcher. Moreover, it is followed by the empirical literature reviews from published journals, books and published academic thesis relating to the study. Both theoretical and empirical literature review have enabled the researcher to establish the research gap of the topic under investigation.

2.2 Conceptualization

2.2.1 Labour Productivity

The concept of labour productivity is defined to mean the value of input invested by each person in an activity per his/her output or the measurement of efficiency as the result of engagement in a labour on the output. This is measured by the change in real economic output per labour hours over a defined period (Pilat, 1996). The theory of labour productivity may also be shared by different authors such as Nur and Muhian, (1988) that its definition when linked to malaria the following variables need to be included for understanding of the concept: work capacity as MI may lead to disability;

Decision on the land use- extent of the land to be cultivated and types of crops; and labour quantity as MI may affect the cognitive development of the farm and school performance. Abdullateef, *et.al*., (2011), link the concept of labour productivity with

the concept of working day lost is also linked to definition of productivity provided that the farm gains lost for number of days not working days or time lost as the value of money which would result into increase in farm crops. Therefore the current study defines the concept of labour productivity basing on the following concepts, effectiveness of work done or labour quality, time value or number of working days on average household income per unit of input incurred as the result of MI ill-person and caregivers of child with MI.

2.2.2 Malaria Infection

Malaria is an epidemic disease which is transmitted to human when one is bitten by an infected mosquito which leaves parasites of the Plasmodium species. If left untreated, the infection in its most severe forms can lead to permanent learning disabilities, coma, and death (Voices for Malaria free feature, 2019).

2.3 Theoretical Literature Review

2.3.1 Human Capital Theory

The theory of human capital was once proposed by Schultz 1961. Becker comes later and developed the theory in 1964. Beckerôs ideas of developing the theory was based from the ground that in 16th, century the human capital has been undermined in economic development and thus the concept become high lightened during education/training in military technology. However, Becker developed the theory basing on Scultzôs concept of return on investment.

The theory assumes that it is the training which raises the productivity of the workers as the result of knowledge and skills being imparted. The theory also assumes that

human capital is equated to physical means of production such as factory and machines. The theory assumes that an investment in human capital can be done in form of training and education. The theory also assumes that human capital is a means of production from which an output depends on the rate of return on the human capital onesô own. The theory also assumes that wage is the function of human capital rather than higher productivity. The theory is criticized by other scholars following its claim that human capital is equivalent to machine has a commodity which is one of the view of capitalism; moreover, the theory is criticized from the fact that it is not education that increases productivity rather than higher productivity which increases wages. The theory is also criticized from the fact that productivity may also be the function of other variables.

The applicability of the theory to the current study comes from the following ground: firstly, human capital variable in productivity is most emphasized in this study taking into consideration that when human capital decrease because of death caused by malaria, this may hinder farm output. The theory also is linked to this study from the ground that when human capital is incapacitated as the result of Malaria infection labour quality in terms of agricultural performance may be hindered. However, human capital substitution is also taken as a controlling variable provided that the theory assumed human capital as a substitutable rather than transferable like land, labour and fixed capital.

2.3.2 Economic Costs and Household Cost of Malaria Infection

European alliance against Malaria outlines economic costs of Malaria and household costs against Malaria. They prostrated that the economic costs against MI led to

lower economic growth and that it costs Africa $ US 12.millions in GDP and that the disease lower the economic growth at 1.3% per annum because of the lost life and lower productivity. The author also explains that the disease has indirect effect on public expenditure for health facilities, infrastructure control in terms of campaign and public education. In Tanzania for instance, 43% of the outpatients attend for treatment with 37% death under five years per a num. Among the indirect costs as the result of the disease include lowering of work productivity as the increase in patientsô absenteeism for work and premature mortality of the work force. Lowering in agricultural products is also reported as the MI occurs mostly during agricultural season. That the disease is extended to household burden including: personal expenditure in terms of treated.

2.4 Empirical Literature Review

Scholars present different views regarding the effect of Malaria on the labour productivity (Jjajri and Ismail, 2010; Ismail, 2015; Jimoh,*et.al.,* 2007; Sicuri, 2007; Amawulu and Dorothy, 2017; Gunda *et al.,* 2017; Hennesse *et. al.,* 2012; and Grardin, *et. al.,* 2004). They present among the variables associated with malaria illness and labour productivity namely household direct and indirect effect, number of lost days/ work absentees and farm output. However, their leading assumption is that malaria illness is linked to social-economic consequences.

House hold costs in relation to labour productivity has been shared in common by different scholars; for instance, sicuri, (2007) in the study done in Ghana, Kenya and Tanzania on the economic costs approximately US$ 5 and 28US$ for no complicated malaria and cerebral malaria with neurological sequelae in Tanzania

and Kenya respectively. Moreover, household average costs were found to be 55% and 70% in Ghana and Tanzania as well as in Kenya respectively. The indirect costs were reported to be 46% in Ghana and 85% in Kenya and Tanzania. The estimates showed that annual costs were US$ 37.8, US$ 131.9 and US$ 109.0 in Ghana Tanzania and Kenya respectively.

Similar observation regarding household costs on malaria have been reported by Amawulu and Dorothy, (2017) and Hennessee*et.al.,* (2017). They all share in common that malaria illness had a direct household cost consequences, for instance, the former scholar study in Nigeria found that there were higher direct costs of treatment costing to N 677.90 to N19, 759.0 higher than when compared to indirect costs. Hennessee, *et.al.,* (2017) add that the observation in Malawi showed that an average costs of $ 17.48 per patient as well as indirect cost which found to be less than direct costs averaged $ 7.59 and $ 9.90 respectively. Such findings were the survey of 36 samples of health facilities. Elsewhere in Sililanka, Maatale District, Attanayakeet. al., (2000) research on the household costs on malaria morbity found that a total costs of Rs 318(US$7) per patient were used. The mentioned amount met that 24%, 44% and 32% were for direct costs for patients, indirect costs for patients and indirect costs for the household. However, loss of output and wages counted for indirect costs of patient and which led to economic loss.

Other scholars like Grardin *et.al.,* (2004) Gunda*et.al.,* (2017) as well as Amawulu and Dorothy, (2017) present loss of working days/work absenteeism in relation to loss of output or decrease in performance of the farm activities. For instance Grardin *et.al.,* (2004) assess that those farmers who suffered from malaria between 8-9 days

(58%) had a lower yields of 53% compared to 47% of those who found to 2 days working day loss. The observation were done from the study in rural Cote dô Ivoire specifically to drill-irrigation vegetable from which the logistic regression analysis was run. Gunda*et.al.,* (2017)established the relationship between lost working days and household income, the authors found that a loss of a number of days per each malaria episode is linked to loss of 24% of the monthly household income. Moreover, Oliver *et.al.,* (2004) similar study in Cote dô Voire found that work absenteeism in drip irrigation vegetable farms correlated with overall yields and revenue.

Scholars also examined the social-economic position of malarial illness to households (Tusting*et al.,* 2016 and Chima *et. al.,* 2003). The former scholars who used a sample of 318 ï children aged 6 months to ten years in Nagongera rural Uganda had found with social-economic effect due to malaria illness. Kangalawe, (2009) reports that healthier person undertakes livelihood activities more better than ill person, this is because human disease like Malaria may led to difficulties in performing labour and sometime led to loss of labour force. Other scholars add that with Malaria in agricultural community may lead to decrease in performing of agricultural activities, national food insecurity, and even interruption of the production cycle as the result of delaying working days (Roll Back Malaria Partnership, 2015).

Makoutode *et. al.,* (2017) also post that malaria illness leads to daily loss of work input and work days and life loss of labour force. More is reported by Jimoh *et .al.,* (2007) that Malaria has found to put a great burden to society provided that people or

household suffer from psychological and physical, mental and social well-being. Scholar adds that individual suffering from Malaria is expected to be physically weak and unable to work for their children and household in general. The author adds that when the disease takes at larger scale in that case at national level, this may also affect countries productivity, growth and finally affecting economic growth (Cole, *et.al*, 2006).

Contrary to prevalence of Malaria illness women may engage in their agricultural production more actively and more consistently with more crops growing and more crop harvests (Roll Back Malaria Partnership, 2015). Likewise, Koram *et al* (1995) emphases that with malaria illness may lead to decrease in crop productions and financial instability. Abdullateef*, et.al.,* (2011) studied on the social-economic impact of malaria on Nigerian households in the area of productivity, expenditure and mortality. Data collected were absenteeism, income loss as well as private costs of treatment collected using questionnaires. Stratified sampling were used to collect data from 9000 households classified as follows , middle and high households income whereby 3000 households were used per each strata.

The researcher had measured expenditure in terms of income expanded on the daily needs of the house, productivity measured in terms of a total time spent by the household out of work or school while dealing with Malaria episodes and mortality measured as a proxy of a number of death occurred in the household. All of the three variables were treated as dependent variables with Malaria Infection (MI) being used as independent variable measured in terms of likelihood of the member of the household having malaria on average month. The descriptive findings showed that

41-50 household heads equivalent to 40.75% had suffered from MI. Less than 30 years old household heads equivalent 17.49% and age between 61-70 house hold heads equivalent to 11.04% had MI over the last 12months.

The findings also showed that above 70 years old equivalent to 3.06% had MI over the last 12months. The analysis for MI also was expressed in terms of household heads by male and female with 87.86% and 12.54% respectively. Household heads by marital status showed that married had found with MI at 74.21% against single leader household with MI at 17.02% over the past 12 months. Household heads by widow had 5.29% MI and by divorced household heads at 3.47% MI over 12 past months. The findings from binary logistic model showed that productivity had a negative relationship with MI since the increase in MI by 10% decreased productivity by 1.4%. Malaria treatment had also found to have a positive effect with private expenditure and MI had a positive effect with mortality rate.

Mcfarland, (2015) assessed the economic impact of malaria in Malawi households were by 11531 national survey households were involved. Among the variables used were household income measured by calculating the wages, remittances, rent and farm production. The calculation of the farm production were done by finding the monetary values of the farm crops using current market values; expenditure prevention of malaria was also measured as another variable using amount spent on bed net, spray, mosquito coils over 12 past months while keeping other costs constant with bed net being included once. Expenditure on treatment was measured using the sum of money used for treatment from the adult and child times malaria episodes per year. Information obtained from the malaria ill person or the caregiver

of the child.

Household expenditure for treatment was divided into very low, moderate and higher income household. Direct costs measured by the researcher also included the following: i) a total annual sum of money spelt for prevention methods; ii) a total sum of money spent per case (child and adult) on treatment at health facility); iii) annual amount of money spent for hospitality per episode of malaria (transportation and food). However, indirect costs included the following: time value spent by ill-person or by caregivers estimated on the average household income.

The findings showed the following: Malawi households depends 92% of its annual income from farm activities; a total of 10% and 4% were spent as expenditure for prevention of MI to all households and low income households respectively. Total prevention expenditure for all methods were $ 2.55 and $0.59 for very low and in low and high household income. In case of methods of prevention used mosquito coils was 2% compared to 9% of low and high household income family. Expenditure on malaria treatment showed that drugs were used as the source of treatment and 52% and 44 % of children and adult respectively went to health facilities for treatment and they spent $ 0.29 and $ 0.57 respectively.

Loss in productivity was also measured in terms of labour effectiveness from which the following were found: i) a total of 299 (52%) out of 575 reported their work to be affected by MI; ii) a total of 97% reported that their work were not affect as usual; iii) 68% reported that they could not do work at all at a minimum of 6.5days. When the researcher measured indirect cost of malaria time-value was used to estimate

over the household average income; they found that one work per day was equivalent to $0.075 thus a total of $ 0.80 and a total of $ 1.33 time value per episodes for child and adult respectively were spent.

2.5 Synthesis and Literature Gap

Literatures present that MI has led to both economic and household costs this includes death of manpower, loss of national and household income through treatment and prevention measures of malaria as well as delayed working hours. The literature also argues that there are both direct (house hold expenditure on prevention and treatment) and indirect costs of Malaria (delaying working days). They also argue that MI has a link with loss of productivity in terms of labour quality and quantity. However, the available studies focused in details on the effect of MI on household expenditure and absenteeism, yet they do not in details study or do not link such variables (household expenditures and delayed work to labour productivity in terms of labour quality and labour output. Thus the current study fills that gap by looking to its effect for policy implication.

2.6 Conceptual Framework

The conceptual framework below shows the relationship between variables. Three independent variables namely Malaria Infection, House hold expenditure and delayed working days are regressed against labour productivity in terms of labour quality and labour output. The available studies (Abdullateef, *et.al.,* 2011; Makoutode*et. al.,* 2017; Kangalawe, 2009; Grardin et.al., 2004) in the social-economic impact of malaria present their assumption under the following directions: firstly Malaria infection is seen as independent variable that has negative effect with

households expenditure on both prevention and treatment, productivity and mortality rate and house hold poverty; secondly, background variables (geographical location, income level, education and age factors) are also linked with positive or negative effect with household labour productivity; thirdly, labour productivity is defined in terms of quality of work performed, time-value lost, number of days lost in treating of MI; fourthly, Household expenditure (treatment and prevention) is also influenced by the level of income, rural or urban area, climate or weather condition.

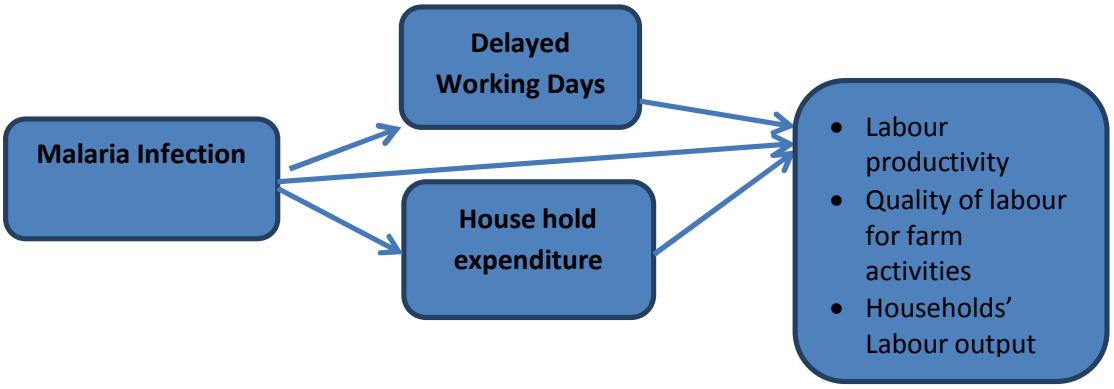

Figure 2.1: Conceptual Framework

Source: Adopted and modified from Mcfarland, 2015

CHAPTER THREE

RESEARCH METHODOLGY

3.1 Overview

The section presents the research philosophy, design, study area, population, sampling, and tools of data collection as well as the analysis plan that used for this study. The justification of the method basing on what, how, how much and why have been presented regarding each section below.

3.2 Research Philosophy

The research philosophy is the one which gives the researcher the way to conceptualize the reality or knowledge. It offers the insight to how the research design, methods of data collection and the way the data analyzed. It therefore forms the outer-layer of the union that are defined by two philosophical perspectives namely positivism and interpretivism philosophical approach (Collis and Hussey, 2003; Saunders *et. al*., 2003:83). Below the union are the research design, methods of data collection and analysis. Positivism approach assumes that knowledge is not socially constructed rather based on quantitative and observational findings. They do not rely on social phenomenon as the source of knowledge.

However, the current study relied on interpretivist which assume that the existence of any knowledge is attached to social phenomenon (Saunders *et al*. 2003; Bryman & Bell, 2003, David & Sutton, 2011), in that case heads of households in Shinyanga District. With this philosophy, the collection of data is based on the questionnaires from the people as the social entity. The analysis is much quantitatively. The researcher therefore aligns with among scholars that social

experience from which human being is shaped needs to be focused (Creswell, 2003).

3.2 Research Design

Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2004). This study is across sectional design from which data are collected at once in a time (Kothari, 2004). To achieve the study design and the objectives of the study, the study employed both descriptive approach and casual-effect approach. However, a mono approach of data analysis has been used namely: quantitative analysis of information.

3.3 Area of the Study

The study was conducted at Tinde ward in Shinyanga rural Tanzania. Tinde ward are among the rural areas which have been affected by Malaria when compared to urban areas. The researcher purposively selected Jomu Village as the target area of the study from the ground that the village ranks the first in highest number of household families when compared to other villages in the ward. The area also has a mixed of population background in terms of education level and income level and marriage status which are also among the variables associated with Malaria Infection.

3.4 Target Population, Sampling and Sample Size

The target population of this study was household heads of the families from Jomu village at Tinde Ward. It should be known that population means the universe from which the sample will be selected (Kothari, 2014). In that case, household heads in Tinde Ward has the target population.

3.4.1 Sample Size

The representative of the whole population or a representative of the universe under study upon a particular judgment is defined as sample size (Kothari, 2004). Kothari explains that such representative sample should be optimal in size (neither large nor small) enough to fulfill the sample characteristics in terms of its efficiency, representativeness, reliability and flexibility. In that case the study selected 70 representative samples from Jomu-village which has a total of 204 household families larger than the remaining villages of the ward.

3.4.2 Sampling Techniques

Simple Random Sampling: The researcher used a simple random sampling to select household head representative from the prepared source list of Jomu village household families. For instance, using simple random sampling the researcher selected the representative sample from household family heads in the village. In that case, the researcher numbered each case in the source frames using letters and then the researcher selected cases blindly from the source frame until the actual sample size was reached. Therefore, the researcher selected a total of 70 household heads from the source list with 204 household heads. Saunders *et. al.,* (2012) explain that this method allows the selection of the sample without bias and the method arrives into a more representative sample.

3.5 Methods of Data Collection

3.5.1 Structured Questionnaire

This method of data collection was conducted to 70 household family heads at Jomu village in Tinde ward. Information relating to their background information such as

occupation, sex and education were collected using this method (See appendix part II). Moreover, questionnaire was also used to collect data from empirical variables namely: delayed working days, household expenditure and Malaria Infection as independent variables and quality of labour as well as labour output as dependent variables.

Table 3.1 Population, Sample Size, Sampling and Tools for Data Collection

Respondents	Population	Sample Size	Sampling Procedure	Collection Tools
Household heads of the family	204	70	Simple random sampling	Structured questionnaires

Source: Research Data, 2019

3.6 Variables and Measurement Procedures

Table 3.2. Variables and Measurement Procedures

Types of Variable	Name of Variable	Definition and measurement of Variables
Dependant variables	Quality of labour	It means work effectiveness as the result of MI, measured by alternative response of weather the quality of labour were affected because one or some of household family did not attend for work) or not affected as usual (they attended for work at the time of MI.
	Householdsô labour output	Expected output of farm yields per kg per day over the average farm gains per 12 past months, measured in terms of time-value over the average past 12 months of the household income.
Independent Variable	Malaria Infection(MI)	Itôs either or neither of the member of the household by age having Malaria Infection on average 12 past month
	Household expenditure (HE)	Means both money spent for prevention and treatment per malaria episodes over 12 past months. In case of Malaria treatment includes annual hospitality (food and transport) and drugs. In case of malaria prevention include bed net used, bed spray and mosquito coils while keeping bed net use constant and being included once over 12 past months.
	Delayed Working Hours	These are the total days lost as the result of adult malaria illness or taking care of the ill child over the past 12 months.

Source: Research Data, 2019

3.6 Quantitative Analysis

3.6.1 Descriptive Analysis

Descriptive statistics has been used to get the frequency, averages and percentage for both background variables (sex, education, age and occupation) and empirical variables. Either the method of analysis has been also used to achieve the specific objectives one, two and three.

3.6.2 Multiple Regression Analysis

Both objectives two and three used Multiple Regression Analysis (Field, 2014) to establish the relationship between household expenditure and working days lost because of MI on household labour output. The following analytical model was used:

$$P(y) = b_o + b1x_{1i} + b2x_{2i} + e_i$$ é é é é é é é é é .. (1)

Where, (y)=Householdôs labour output. x_{1i} = Work days lost; x_{2i} = House hold expenditure.

e = the error term to capture all variables not included in the model.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Overview

This chapter presented the findings of the research. The researcher used descriptive statistics to achieve specific objectives one, two and three and multiple regression to achieve specific objectives two and three respectively. The specific objectives for this study included the following: to establish the extent to which Malaria Infections affect household quality of labour invested for farm activities; to assess the extent to which delayed working days as the result of Malaria Infections affected the farm output; to examine the extent to which household expenditure as the result of Malaria Infections affected the farm outputs.

4.2 Test of Reliability and Validity

Maxwell. (1996) and Ballinger, (2000) defined validity as the measure of what is supposed to be measured or the correctness of the findings. The researcher in this study used close ended questions to measure for the validity. Likewise reliability is defined as consistency of the finding (George and Mallery, 2003). The researcher used a Cronbachôs alpha to measure the reliability. The interpretation of the cronbach alpha values from the current study meant as follows: Cronbachôs alpha greater than 0.9 means excellent consistency, greater than 0.8 means good consistence, 0.7 means acceptable, 0.6 means questionable, greater than 0.5 means poor and less than 0.5 is unacceptable (George and Mallery,2003).

Table 4.1 showed that both quality of work to be performed by household family were affected as a result of malaria infection of 0.718. Moreover, extent to which

household expenditure spent on treatment and prevention of malaria at household family had a good consistence of 0.875; Age group affected by malaria had an excellent consistency of 0.926. Therefore the findings imply that there were no findings with unacceptable consistency.

Table 4.1 Test of Reliability for the Findings

Variables	Cronbachôs alpha	Number of items
Age group affected by malaria	0.926	5
Quality of work to be performed	0.718	5
Household expenditure spent on treatment and prevention	0.875	6

Source: Research Data, 2019

4.3 Descriptive Analysis for Background Variables

4.3.1 Sex of Respondents

Table 4.2 shows the sex of the respondents. The sex of the respondents was measured in terms of male and female values. There were a total of 70 household respondents. The findings showed that most of respondents were female represented by 38 (54.3%) of the total population followed with male household respondents at the frequency rate of 32 (45.7%).

Table 4.2: Sex of Respondents

Detail s	**Frequency(N)**	**Percent (%)**
Male	32	45.7
Female	38	54.3
Total	70	100.0

Source: Research Data, 2019

4.3.2 Age of Respondents

Table 4.3 shows the age of the respondents. This research measured the age of respondents in terms of the years reached by respondents since born. The findings from descriptive analysis showed that most of respondents were at the age above 40 years, presented by the frequency of 27 respondents, equivalent to 38.6%. Those respondents below 30 years were 12 equivalents to 17.1%. The respondents between 30-35 years old were 17(24.3%) and respondents between the age of 35-40 years were 14(20%). The findings imply that most of the household family are found at the age above 40 years and at the age between 30-35years.

Table 4.3: Age of Respondents

Details	Frequency	Percent
Below 30 years	12	17.1
Between 30-35 years	17	24.3
Between 35-40 years	14	20.0
Above 40 years	27	38.6
Total	70	100.0

Source: Research Data, 2019

4.3.3 Marital Status of Respondents

Table 4.4 shows marital status of the respondents. Marital status of respondents was measured in terms of married and unmarried. The findings from descriptive analysis showed that those who were married ranked the first at the frequency rate of 54 respondentôs equivalent to 77.1%. Respondents who were unmarried ranked the second at the frequent rate of 16 respondents equivalent to 22.9%. This implies that most of households in the study area were married.

Table 4.4: Marital Status of Respondents

Details	Frequency(N)	Percent (%)
Married	54	77.1
Unmarried	16	22.9
Total	70	100.0

Source: Research Data, 2019

4.3.4 Education Background of the Respondents

Table 4.5 shows education background of the respondents. Education background of the respondents was measured in terms of the level of education reached by the respondents. The findings from descriptive analysis showed that there were 65 (92.9%) of respondents who hold primary education. Only 2 (2.9%) of the respondents holds both secondary and postgraduate education. Either there is only 1(1.4%) respondent who holds a university education. The findings imply that most of the household in Jomu village hold a primary level of education.

Table 4.5: Education Background of the Respondents

Details	Frequency(N)	Percent (%)
Primary education	65	92.9
Secondary education	2	2.9
University education	1	1.4
Post graduate	2	2.9
Total	70	100.0

Source: Research Data, 2019

4.4 Descriptive Analysis for Empirical Variables

The section presents empirical variables (independent and dependent variables) namely number of family by age group affected with malaria, number of days ill-person affected with malaria and family expenditure (treatment and preventions), all

as independent variables and quality of work to be performed as well as farm output yields , all as dependent variables.

4.4.1 Family Members Affected by Malaria

Table 4.6 shows the number of the household family affected by Malaria. The researcher measured it by age group over 12 past months. The respondents were required to supply their response by selecting a tick to one of the responses: 1= not at all, 2= few of them, 3= not sure, 4=averagely affected, 5= mostly affected. The findings showed below 30 years old were mostly affected with malaria over 12 past months; it has a mean value of 5.000 at the standard deviation of 0.0000. Family members at the age of 31-40 were the next group to be affected with malaria since the findings showed that there were few of them who had suffered from malaria over 12 past months at the mean values of 1.7 and standard deviation of .84012.

Table 4.6: Age Group Affected by Malaria

Details	**N**	**Mean**	**Std. Deviation**
less than 30 years affected by malaria over 12 past month	70	5.0000	.00000
Between 31-40 years affected by malaria over 12 past month	70	1.7000	.84012
Between 41-50 years affected by malaria over 12 past month	70	1.1429	.35245
Between 51-60 years affected by malaria over 12 past month	70	1.1857	.45977
Above 61 years affected by malaria over 12 past month	70	1.1286	.33714
Valid N (listwise)	70		

Source: Research Data, 2019

Other age groups had found not to be affected with malaria over the past 12 months. For instance, family members at age group of 41-50 had a mean values of 1.1429 at the standard deviation of .35245, family members at the age of 51-60 had the mean values of 1.1857 at the standard deviation of 0.45977 and family member above 60 years old had also not suffered from malaria at all over 12 past months; it mean values were 1.1286 at the standard deviation of .33714.

4.4.2 The Number of Days Family Members suffered from Malaria

In Table 4.7 shows the number of the family suffered from Malaria over 12 past months. The researcher measured the number of days in terms of the total weeks ill-person had suffered from malaria. The findings from descriptive analysis showed that most of family member had suffered for one week before recovery; this is shown by a frequency of 52 family members equivalent to 74.3%, a total of 11 members of the family had suffered for two weeks equivalent to 15.7%. A total of 4 members had suffered for three weeks equivalent to 5.7% and a total of 3 family members had suffered for 3 weeks equivalent to 4.3%.

Table 4.7: Number of Days Family Members Suffered from Malaria over 12 Past Months

Details	Frequency	Percent
One week	52	74.3
Two weeks	11	15.7
Three week	4	5.7
Five week	3	4.3
Total	70	100.0

Source: Research Data, 2019

4.4.3 House Hold Expenditures (Treatment and prevention) for Malaria

Table 4.8 shows the household expenditure for treatment and prevention of malaria. The researcher measured household expenditure in terms of treatment and prevention from which respondents were asked to supply their responses against the developed factors using five Likert scales namely; 1= highly disagree, 2= disagree, 3= not sure, 4= agree, 5= highly agree. The findings from descriptive analysis showed that most of household family highly agreed that they have spent money for buying mosquito coils at the mean values of 4.7000 and standard deviation of .99782.

Table 4.8: Household Expenditures for Malaria Treatment and Prevention

Factors	**N**	**Mean**	**Std. Deviation**
Money spend on buying mosquito coil	70	4.7000	.99782
Money spend on buying bed-net	70	2.9143	1.99087
Money spend on buying spray	70	1.3143	1.04317
Money spend on buying Drug for malaria treatment	70	3.7286	1.79307
Money spend for food (for ill person and those taking care of)	70	4.08571	1.501138
money spend for transport cost	70	1.8000	1.38940
Valid N (listwise)	70		

Source: Research Data, 2019

Respondents also agreed that they spent money for buying drugs; mean value 3.7286,standard deviation 1.79307, they spent money for food of ill-person and those taking care of the ill person mean value 4.08571 and standard deviation 1.50113, they also spent money for buying bed-nets, at the mean values of 2.9143 and standard deviation 1.9908. Moreover, respondents highly disagree that they did not use money for buying sprays; their mean scores were 1.314 and standard deviation

of 1.04317. Respondents also disagree that they did not use money for transportation costs; this is shown by the mean values of 1.800 and standard deviation of 1.389.

4.4.4 Quality of Work Affected

Table 4.9 shows the quality of works affected as the result of malaria infection to family members. The quality of work affected was measured by alternatively responses namely1= yes (attended) and 2= no (not attended). The findings from descriptive analysis showed that family members did not attend to work because of the ill-person at household family, they did not attend for work as they went for the burial, they did not continued with their work despite of being sick, and that they did not hire wage labour despite the ill-person. Their results ranged from mean values of 1.5429 to a maximum of 1.9143. Either their standard deviation ranged from .28196 to a maximum of .50176.

Table 4.9: Quality of Work to be Performed by Household Family

Factors	**N**	**Mean**	**Std. Deviation**
Despite of malaria occurrence work has done as usual	70	1.6571	.47809
Malaria affection had led to spent in burial rather than working for farm work	70	1.9143	.28196
some of Family members had to take care of malaria sick person rather than working	70	1.9000	.30217
House head proceed with their work alone despite of being sick	70	1.5429	.50176
Employ wage labour to proceed with my farm work	70	1.6714	.47309
Valid N (listwise)	70		

Source: Research Data, 2019

4.4.5 Household Expenditure Spent on Treatment and Prevention of Malaria

Table 4.10 shows household expenditures (treatment and preventions) over 12 past months. The researcher measured household expenditure in terms of treatment and prevention measures over 12 past months. Moreover, bed net was considered to be bought at once within the year. The respondents were asked to supply their information using five linkert scales namely:1= highly disagree, 2= disagree, 3= not sure, 4= agree, 5= highly agree.

Table 4.10: Household expenditure Spent on Treatment and Prevention of Malaria

Factors	N	Mean	Std. Deviation
Expected farm yield for bed splays	70	1.4857	1.16399
Expected farm yield spent on buying net	70	1.5143	1.01785
Expected farm yield for buying mosquito coils	70	1.2143	.83219
Expected farm yield for buying drugs	70	1.5714	.91003
Expected farm yield for buying food for ill person and taking care of ill-person	70	1.3286	.73665
Expected farm yield for incurring transportation cost	70	1.0571	.23379
Valid N (listwise)	70		

Source: Research Data, 2019

The findings showed household heads disagree that no farm yields had to be spent because of buying bed nets and that no farm yield would be lost because of buying drugs; these are shown by a mean values of 1.5143 and 1.5714 respectively, with standard deviation of 1.0178 and .91003 respectively. Other remaining factors showed that household heads had to highly disagree that expected farm yield had to be lost because of treatment and preventions in terms of buying beds spray, buying mosquito coils, buying food for ill-person and those taking care of them and for transportation costs.

4.5 Testing of Assumptions of the Model (1) Namely Multiple Regression Analysis

Before running the model the researcher has been interested in understanding the extent to which the data fits the general population (Field, 2014), in that case, assumptions such as correlation, multicollinearity, autocorrelation and normality were tested.

4.5.1 Correlation Analysis for the Number of Days Suffered, HE and Labour Output

Table 4.10 shows the correlation between variables. Correlation of variables is when both the dependent and independent variables are related. Such correlation may be negative represented by -1.00 or positive correlation represented by +1.00. This study used a two-tailed Pearson correlation test. Both independent variables and dependent variables were shown in Table 4.11.

Table 4.11: Correlation between HE, Delayed Working Days and Labour Output

		Household expenditures	Number of Days Suffered	Household labour output
Household expenditures	Pearson Correlation	1	.269*	.290*
	Sig. (2-tailed)		.024	.015
	N	70	70	70
Number of Days Suffered	Pearson Correlation	.269*	1	.213
	Sig. (2-tailed)	.024		.077
	N	70	70	70
Householdsô labour Output	Pearson Correlation	.290*	.213	1
	Sig. (2-tailed)	.015	.077	
	N	70	70	70
*. Correlation is significant at the 0.05 level (2-tailed).				

Source: researcher, 2010

The findings showed that independent variable (household labour output) had a positive and significant correlation with household expenditures, below shows the correlation values of .269 at sig values of .015(< 0.05). Either household labour output had a positive and significant relationship with number of days suffered; the table below shows the correlation values of .269 at sig values of .024.

4.5.2 Testing the Assumptions of Multicollinearity Test on HE and Number of Working Days

Researchers are too concerned with the degree to which the predictors correlate to each other. However, the leading assumption is that predictors should not correlate too highly and that there should be what is called multicollinearity (Field, 2014, p. 312). This study adopted Variance Inflation Factors (VIF) as a measure of multicollinearity. It is the role of thumb that VIF close to 1 the better, and VIF< 5 may be not a course of concern.

Table 4.12: Mult-Collinearity Test on Household Expenditures and Number of Days Suffered

Model		Collinearity Statistics	
		Tolerance	**VIF**
1	Household expenditures	.927	1.078
	Number of Days Suffered	.927	1.078
a. Dependent Variable: Farm Output			

Source: Research Data, 2019

Likewise, Tolerance level >0.2 may be not a course of concern. Therefore, table 4.12 shows that the VIF for household expenditure and number of working days are likely not to be the course of concern, provided that VIF for both house hold expenditure

and number of working days are 1.078 which is <5. The tolerance level for both house hold expenditure and number of working days are .927 which is >0.2. These findings imply that the assumption for Multicollinearity was met.

4.5.3. Checking Linearity between Number of Days suffered and Household Expenditure

The researcher in this study was interested in measuring autocorrelation of the model. This assumption assumes that the residuals terms need to be uncorrelated. This assumption of independence is called autocorrelation. When the assumption is violated, it implies that both the level of significant and level of confidence will become invalid. The researcher used Durbin Watson statistics measure to calculate the effect size of the assumption. However, the role of thumb is that the test statistics can vary from 0-4 whereby 2 values mean that the residual are uncorrelated, <2 positive correlated, and <1 or >3 is a course of concern (Field, 2014, p. 311). In that case, Durbin Watson test statistics shows the residuals are not correlated which implies that 2.208 are acceptable.

Table 4.13: Test of Autocorrelation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.322[a]	.104	.077	.65373	2.208
a. Predictors: (Constant), Number of Days Suffered, House hold expenditures					
b. Dependent Variable: Householdsô labour output					

Source: Research Data, 2019

4.5.4 Test of Normality

The current study tested the assumption of normality by using Shapiro-wilk statistical test as shown in table 4.14. The results show that the tested variables were

significantly correlated at the P-values of 0.05, This means that most of the variables had no influential cases or much residual.

Table 4.14: test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Household Expenditure	.213	70	.000	.926	70	.000
Number of Days Suffered	.437	70	.000	.569	70	.000
Farm Output	.317	70	.000	.544	70	.000
a. Lilliefors Significance Correction						

Source: Research Data, 2019

4.5.6 Test of Homoscedasticity Assumption

Heteroscedasticity means presence of error of variance in the linear regression model which is a violation against homoscedasticity variance assumption. Gujarat and Porter (2010) state that heteroscedasticity can be diagnosed by using White Test. According to them, White Test can be done by comparing the value of calculated and observed Chi-square values by using the formula: $\chi^2 = N \times R^2$ whereby χ^2 = is the calculated Chi-square, N= is the number of observation and R^2 = R-Square or coefficient of determination. The rule of thumb is: When Chi-square calculated is less than Chi-square observed there is no heteroscedasticity problem in the model. From the data analysis (Table 4.20a) R^2=0.104 and N=70, therefore calculated. X^2=0.104*70=7.28

While the Chi-square observed at 0.05 level of significance and N=0 is 95.023. The result indicates that calculated Chi-square is less that observed Chi-square which imply that the model does not exhibit heteroscedasticity problem

4.6. Output from Relationship between Number of Days suffered and HE and Labour Output

Farm output was regressed against number of days suffered from malaria and household expenditures on prevention and treatment. The researcher used multiple regression analysis model as illustrated below:

$$P(y) = b_o + b1x_{1i} + b2x_{2i} + e_i$$

Where;

P(y) =Householdôs labour output. x_{1i} = Work days lost; x_{2i} = House hold expenditure.

e = the error term to capture all variables not included in the model.

Table 4.15: Summary for relationship between number of days suffered, HE and output

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.322[a]	.104	.077	.65373	2.208

a. Predictors: (Constant), Number of Days Suffered, Household Expenditures

Source: Research Data, 2019

The results are presented in Tables 4.15 and 4.16. Table 4.15 shows that the relationships between farm labour output and number of days lost from malaria suffering and household expenditure was weak but significant presented by Adjusted R-square 7.70%, p-values, .026. (see table 4.16) table 4.17 shows that the result from

standardized coefficient was .251 for household expenditure and significant values of .041, meanwhile standardized coefficient for number of days suffered were .145 at the significant values of .231.

Table 4.16: ANOVA Analysis to Show the Relationship of Days Suffered, HE and Labour Output

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	3.309	2	1.655	3.872	.026[a]
	Residual	28.634	67	.427		
	Total	31.943	69			
a. Predictors: (Constant), Number of Days Suffered, Household expenditures						

Source: Research Data, 2019

Table 4.17: Coefficients showing Relationship between Days Suffered, HE and labour output

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	.541	.314		1.724	.089
	Household expenditures	.209	.100	.251	2.088	.041
	Number of Days Suffered	.125	.104	.145	1.209	.231
a. Dependent Variable: Households' labour Output						

Source: Research Data, 2019

The relationship between the model as shown in table 4.15 showed that when two independent variables namely number of days suffered from MI and household expenditures are regressed against household labour output the effect becomes weak provided that adjusted R2 squares is 7.70%. Such relationship is significant at the p-

values of .026.

The relationship between variables in specific objective one is also shown. The results from coefficient values in table 4.17 also showed that the relationship between the numbers of dayôs family members affected with malaria on household farm output. The results were shown by Beta- values of .144, at sig- values of .231. The findings imply that for every increase in number of days suffered from MI by household member of the family there were an increase of 14.4 sacks as expected household quantity of output to be lost over 12 past months.

The relationship between variables in specific objective three was also presented. The result of coefficients for the relationship between household expenditures and household quantity of labour output is also shown in table 4.17 above. The results were showed by Beta-values of .251at the sig-values of .041. The findings imply that for every increase in household expenditures on malaria treatment and prevention there were an increase of 25.1 sacks as an expected household quantity of output to be lost over 12 past months.

4.7 Discussion of Findings

4.7.1 The Effect of Malaria Infections on Household's Quality of Labour Invested

The first objective aimed to examine the extent to which Malaria Infections affect labour productivity in terms of householdôs quality of labor invested. The researcher had measured the household malaria infection by number of family members by age groups suffered from malaria over 12 past months. The descriptive analysis has

been used by the researcher to run the analysis for the first objective above. The descriptive analysis showed that household family below 30 years old were mostly affected over 12 past months. The findings showed below 30 years old were mostly affected with malaria over 12 past months. Family member between the age group of 31-40 ranked the second to be affected with malaria infection. However, other age groups above 40 years old had little if any infection of malaria. The findings above imply that it is the productive age groups which have been found to be affected with malaria unlike those age groups which were less productive.

The past study (Abdullateef, *et.al,* 2011) concur with the current study from the observation that those members of the family who are productive force are those likely to suffer from Malaria Infection. However what remains contrast with this study is that the current study found that family members below 30 years old were prone to Malaria infection unlike 40-50years old as presented from Abdullatee, *et.al,* (2011). Moreover, whether having family members with malaria infection could affect the quality of labour was the interest of the researcher. When descriptive analysis for quality of labour to be affected was run, the findings had shown that those expected labour force of the family were affected in a way that they did not attend for a work because of the ill-person.

The findings concur with the past study which explain that the possibility for not attending for farm work may be explained by the family members from not attend actively and consistently on production (Roll Back Malaria Partnership, 2015). The study also concurs with other studies which emphasized that family members do not attend for work since the disease make them weak mentally and physically (Jimoh,

et al. 2007); they emphasize that there is a possibility of not attending for work because it becomes difficulty for them to perform work (Kangalawe, 2009). The findings also found that some time they had to stop attending for their work so as to attend for burial ceremony something which might have affected the production as Abdullateef *et al* (2011) reported that there were negative relationship between malaria infection and production since 10% increase in malaria infection had an increase of 1.4% in production.

4.7.2 The Effect of Number of Days Family Members Suffered on Labour Output

The second objective aimed to assess the extent to which delayed working days as the result of Malaria Infections affect labour productivity in terms of household's labour output. The findings from descriptive analysis showed that most of family members 52 (74.3%) had suffered from malaria for a week. Either 11 (15.7%) members of the family had suffered from malaria infection for two weeks. A total of 4 (5.7%) members of the family had suffered for three weeks. Only three 3(4.3%) family members had suffered from malaria infection for 4 weeks. The findings implied that it is likely that most of family members suffer a single week from malaria attack and the least of the day they continue with their farm productions. Either the remaining few members of the family who may take two or to three weeks might have not negatively influenced the household farm output.

Moreover, the researcher established the relationship between the number of days family members affected with malaria and household farm output. It has been found that the relationships between farm labour output and number of days lost from

malaria suffering was weak but significant presented by Adjusted R-square 7.70%, p-values, .026. This implies that the reasons for having a weak relationship might have been grounded in the few days usually one week that most of household at Jomu villages suffer from Malaria infection, from which they resume their work as usual soon after recovery. For instance, the findings concur with the past studies (McFarland, 2015) which also found that a total of 97% of the respondents reported that their works were not affected as usual.

Either the findings also showed that standardized coefficient for number of days suffered were .145 at the significant values of .231. This implies that for every increase in the number of dayôs household family members suffered from malaria infection, there were relative significant and positive changes in farm output by 14.4%. This is to say that the number of days lost because of malaria infection had a small significant effect on the householdsô farm output, however whatever an increase in output occurred such change had small effect to all population at Jomu village. The current study concurred with past studies (Grardin, et.al.; 2004, Gunda, et al.; 2017, Amawulu and Dorothy, 2017) which found that as number of days lost for production did not affect negatively the householdsô farm output; for instance they found that between 8-9days there was loss in 58% of yields and for 2 days lost there were a loss of 47% yields.

5.4 The Effect of Household Expenditure on Household Labour Output

The third objective aimed to examine the extent to which household expenditure on Malaria Infections affect labour productivity in terms of householdôs labour output. The researcher measured household expenditure in terms of treatment and

prevention over 12 past months. The measurement indictors used were bed-net, mosquito coils, bed sprays, buying drugs, transportation costs and food for both ill-person and those taking care of the ill-person. Five linkert scales were used to supply the responses.

The findings from descriptive analysis showed that household heads disagree that no farm yields had to be spent because of buying bed nets and that no farm yield would be lost because of buying drugs. Other remaining factors showed that household heads highly disagree that expected farm yield had to be lost because of treatment and preventions in terms of buying bed sprays, buying mosquito coils, buying food for ill-person and those taking care of them and for transportation costs. However, such responses might have been contributed by lack of accurate records over the year on the amount of money they might have spent for malaria prevention or treatment.

However, Past studies did not concur with the current study from the fact that they all claim that malaria infection has economic costs to household family in terms of treatment and prevention (Sicuri, 2007; Amawulu and Dorothy, 2017). They report that an average costs for household costs on malaria in Tanzania were 70%, and 55% for Ghana and 85% for Kenya. The findings from multiple regression analysis imply that for every increase in household expenditures on malaria treatment and prevention there were an increase of 25.1 sacks as an expected household quantity of output to be lost over 12 past months. Such effect as the result of relationship between variables is medium in size, however this effect size might have been caused either by the large size of the family with labour force who engage in production and that no a no prolonged time may be lost when one of the families is

suffering from Malaria. Either the study may concurs with Cole *et al.,* (2006) who support the current findings by asserting that when Malaria infection takes large scale with the use of expenditure for treatment and prevention it is likely that the situation can affect production.

Generally, the economic costs of malaria infection and their implications on labour productivity in Shinyanga showed that there were loss of number of days by household who affected with malaria as well household expenditures for treatment and prevention of malaria. Either such economic costs show that the relationships between farm labour output and number of days lost from malaria suffering and household expenditure was weak but significant presented by Adjusted R-square 7.70%, p-values, .026. Either an increase in household expenditure for treatment and prevention had a significant increase in farm output by 25.1%. Moreover, every increase in the number of days household family member suffered from malaria infection, had significant and positive change in farm output by 14.4%.

CHAPTER FIVE

SUMMARY, CONCLUSSION AND RECCOMMENDATIONS

5.1 Overview

This chapter chronologically, presents summary, conclusion, policy recommendations and areas for further study.

5.2 Summary of the Main Findings

5.2.1 Malaria Infections Affect Labour Productivity in Household's Quality of Labour

The findings from descriptive analysis showed that most of family members affected by malaria are those under productive age group below 30 years old and age group between 31-40 years old. Other remaining age groups were less likely to have been affected by Malaria. Either Malaria infection has affected their quality of labour in a way that they did not attend for a work, the possibilities being physical, mental weak, inactive and inconsistency in attending for farm production.

5.2.2 Delayed Working Days resulted from MI Affect Labour Productivity in Labour Output

The findings from descriptive analysis showed that most of family members affected by malaria to a maximum of one week with few of them being ill from two up to three weeks. The findings from multiple regression implied that for every increase in the number of days household family member suffered from malaria infection had significant and positive increase in farm output by 14.4%.

5.2.3 Households Expenditure on MI affect Labour Productivity in Household's Labour Output

The findings from the descriptive analysis showed that household heads disagree that no farm yields have been spent because of malaria treatment and prevention. Either, multiple regression analysis showed that an increase in household expenditure for treatment and prevention had a significant increase in farm output by 25.1%.

5.3 Implications of the Findings

Firstly, the findings from objective one implies that farm productivity in terms of quality of labour are likely to be affected provided that the age groups that are affected with malaria infection are those labour force below 40 of ages. Secondly, the findings from objective two implies that although most of family members were reported to suffer from malaria within a week to recovery, such instance is not a case of concern as far as farm output are concern. Thirdly, the findings from objective three implies that household expenditures on treatment and prevention is a matter of concern provided that quota of the farm output had been used for treatment and prevention.

5.4 Policy Implication

Through the results obtained, when controlling malaria (prevention and treatment) will increase productivity, since the diseases takes small scale or eradicating at all quality of labour and labour output might be improved and leads to increase economic growth and wellbeing of the households.

5.5 Conclusion

Generally, the economic costs of malaria infection and their implications on labour

productivity in Shinyanga showed that there were loss of number of days by household who affected with malaria as well household expenditures for treatment and prevention of malaria. Either such economic costs show that the relationships between farm labour output and number of days lost from malaria suffering and household expenditure was weak but significant presented by Adjusted R-square 7.70%, p-values, .026. Either an increase in household expenditure for treatment and prevention had a significant increase in farm output by 25.1%. Moreover, every increase in the number of days household family member suffered from malaria infection, had significant and positive change in farm output by 14.4%.

5.6 Policy Recommendations

It is recommended that education policy regarding Malaria prevention and treatment should specifically be age sensitive provided that those energetic or force labour are those found to be affected with malaria infection to the extent that affect household labour output and labour quality to be invested.

5.7 The Contribution of the Study to the Theories

The theory adds knowledge on human capital theory which emphasizes among the things that when human capital is weakened in terms of physical and mental ill-ness, it is likely to affect the productivity in that case quality of labour and household farm output. Moreover, the study build its knowledge on the existing literature that Malaria infection may be realizes by age group which are also linked to labour productivity in a positive direction, like wise house hold expenditure has a positive direction with labour productivity.

5.8 Limitation of the Study

Among the limitations encountered in this study is the reluctance of some of respondents in participating for data collection as they believed that no attention will be made by providing them with conducive working environments. However, the researcher made them aware through their officers and finally most of them showed cooperation.

5.9 Area of Further Research

The study aimed to investigate the economic costs of malaria infection and their implications on labour productivity in Shinyanga. The findings showed that there were economic costs of malaria infection since there were loss of number of days as the result of malaria infection as well as household expenditures were spent for treatment and prevention of malaria. Either such economic costs show that the relationships between number of days suffering and household expenditure on household labour output was weak. However, the current research had a methodological limitation regarding quality of labour invested in relation to number of family members affected with malaria since the analysis used descriptive rather than empirical statistical analysis.

REFERENCES

Abdullateef, U. A. & Oluwatoyin, M. (2011). ñSocio-Economic Impact of Malaria Epidemics On Households In Nigeria: Micro evidence From Kwara Stateò *International Journal of Asian Social Science,* 1(5), 188-196.

Alaba, O. A. & Alaba, O. B. (2002). ñMalaria in Children. Implications for the productivity of female caregivers in Nigeriaò. Proceeding of Annual Conference of the Nigerian. Lagos, Nigeria.

Amawulu, E. Dorothy, A. A. (2017). The Cost Implications of Malaria Burden on House Hold Expenditure among Socio-Economic Classes in Bayelsa State, Nigeria. *J Trop Dis,* 5: 239.

Ayodele, J., Oluyemi, S., Amos, P. & Okorosobo, T. (2007). Quantifying the economic burden of malaria using the willingness to pay approach. *BioMed*., 5, 1-8.

Chima, R. I., Goodman, C. A. & Mills, A. (2003). ñThe economic impact of malaria in Africa: a critical review of the evidenceò *Health Policy,* 63, 17ï 36.

Cole, T. (2006). Medicine and Hygiene, *America Journal of Tropical medicine and hygiene,* 74(3), 413-421.

Collis, J. & Hussey, B. (2003), Introduction to Content Analysis and Techniques. *The Market Review,* 3(4), 479-398.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and Conducting Mixed Methods Research*. London: SAGE Publications.

Field, A. (2014). *Discovering statistics using IBM SPSS statistics,* 4th, ed. London: International Ltd., *Finance*, 52(2), 78-105.

Jimoh, A., Sofola, O., Petu, A. & Okorosobo, T. (2007). Quantifying the economic

burden of malaria in Nigeria using the willingness to pay approach. *Cost Eff. Resour. Alloc*., 22, 5-6.

Koram, K. A, Bennett, S, Adiamah, J. H, Greenwood, B. M. (1995). Socioeconomic risk factors for malaria in a peri-urban area of the Gambia. *Trans Roy Soc Trop Med Hyg*., 2, 74-89.

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques.* New Delhi: New Age International publisher.

Mcfarland, A. D., Schultz, J. L. & Chitsulo, L. (1992*).* Economic impact of malaria households, retrieved on 30th March, 2019 from; http//www.researchgate.net/ publication/15133638.

OECD World Forum, (2009). Human capital and its measurement. ñThe 3rd OECD World Forum on statistics, knowledge and policyò charting progress, building vision, improving life.

Onwujekwe, O, Nkoli, U. & Enyi, E. I. C. (2013). The economic burden of malaria on households and the health system in Enugu state Southeast Nigeria. *PLoS One,* 8, 11-15.

Onwujekwe, O., Chima, R. & Okonkwo, P. (2013). *"Economic Burden of Malaria Illness on Households Versus that of all other Illness Episodes:* A Study in Five Malaria Holo-Endemic Nigerian Communitiesò. Amsterdam, Netherlands.

Roll Back Malaria Partnerships, (2015). Releases new strategies to guide global efforts towards malaria elimination by 2020/20130. Action and Investment to defeat Malaria 2016-2030, World Health Organisation.

Saunders, M., Lewis, P. & Thornhill, A. (2003). *Research Methods for Business.*

London: SAGE publication Ltd.

Shayo, A. (2014). Therapeutic Efficacy and Safety of Artemether-lumefantrine for the treatment of uncomplicated falciparus Malaria in North Eastern Tanzania.

Sicuri, E., Ana, V., Leandro, L, Dagna, C. & Christophe, S. (2013). ١ e economic costs of malaria in children in three sub-saharan countries. Ghana, Tanzania and Kenya. *Malar, J.* 12, 307-320.

Taylor-power, E. & Renner, M. (2003). *Analyzing qualitative data. Retrieved on 21st June 2018 from http://learningstore.uwex.edu/asserts/pdfs/g3658-12pdf.*

Usman, A. & Adebayo, M. O. (2011). Socio-economic impact of malaria epidemics on households in Nigeria: Micro evidence from Kwara State. *Int J Asian Soc Sci.* 1, 188-196.

APPENDICES

APPENDIX I: BASIC PROFILE OF THE HOUSEHOLD HEADS

Respondents, kindly be informed that this section requests you to fill information relating to both your background information.

S.NO	Variables	Categories	Frequency	Percentages (%)
1	Sex	1= Male		
		2=female		
2	Age	1=Below 30 years		
		2=Between 30 -35 years		
		3=Between 35 -40years		
		4=Above 40 years		
3	Marital status	1=Married		
		2=Unmarried		
4	Education Background	1=Primary education		
		2=Secondary education		
		3= degree programme		

APPENDIX II- DESCRIPTIVE QUESTIONNAIRES

QUESTION ONE

The question aim to examine the extent to which Malaria Infections affect labour productivity in terms of householdôs quality of labor invested**.**

(a) This sub question aims to explain either or nor of the household family by age group was/were affected by Malaria Infection over 12 past months. You are kindly required to supply your response by selecting a tick to one of the responses: 1= not at all,, 2= few of them, 3= not sure, 4=averagely affected, 5= mostly affected

Items	1	2	3	4	5
Less than 30 years of age at family holds were affected by Malaria infection over 12 past months.					
Between 31-40 of age at household family were affected by Malaria infection over 12 past months					
Between 41-50 household family members were affected by malaria over 12 past months					
Between51-60 household family members were affected by malaria infection over 12 past months.					
Above 60 years old household family members were affected by malaria infection over past 12 months					

1(b) This sub-question aims to explain how the quality of work to be performed by household family were affected as the result of Malaria infection. You are kindly required to supply a TICK from the following alternative binary responses: 1= attended for work, 2= not attended for work.

Items	1	2
With the occurrence of malaria in my household family other member members of the family had to continue with farm work		
The malaria infection had led to spent in burial due to malaria deaths rather than working for farm work		
Some of the family members had to take care of malaria sick person rather than working for farm activities		
When I fall sick of malaria as the head of household I normally proceed with my work		
When I fall sick of malaria I normally employ wage labour to proceed with my farm works		

QUESTION TWO

The question aims to assess the extent to which delayed working days as the result of Malaria Infections affect labour productivity in terms of householdôs labour output.

a) If you have been suffered for malaria infection over past 12 months, can you tell the total number of days you have been suffered for: 1= one week, 2= two weeks, 3= three weeks 4= four weeks, 5= five weeks?

Item	1	2	3	4	5
How many days you or one of your household family has suffered from Malaria infection over the period of 12 past months					

b) Can you tell the total quantity of the farm yields that you lost because of the number of days you or your household family lost being suffered from malaria or taking care of the ill-person over past 12 months? You are required to supply your responses from the following five linkert scale responses; 1= below 5 sack of farm yields were lost, 2= 05 sacks of farm yield were lost 3= 10 sacks of farm yield were lost, 4= 15sacks of farm yield were lost, 5= above 15 were lost.

Item	1	2	3	4	5
How much quantity of farm output your household family had loss of maize harvest over 12 past months because of days lost on malaria ill-person and taking care after malaria sick person without attending for farm work?					
How much quantity of output your household family had loss of rice harvest over 12 past months because of days lost on malaria ill-person and taking care after malaria sick person without attending for farm work?					
How much quantity of farm output your household family had loss of millet harvests over 12 past months because of days lost on malaria ill-person and taking care after malaria sick person without attending for farm work?					
How much quantity of farm output your household family had loss of cotton harvest over 12 past months because of days lost on malaria ill-person and taking care after malaria sick person without attending for farm work?					

QUESTION THREE

The question aims to examine the extent to which household expenditure on Malaria Infections affect labour productivity in terms of householdôs labour output.

a) The aim of this question is to examine the total house hold expenditures spent because of malaria treatment per episode over 12 past months. You are required to supply your responses from the following five linkert scale responses: 1= highly disagree, 2= disagree, 3= not sure, 4= agree, 5= highly agree.

Item	1	2	3	4	5
My household family has spent money for buying bet net as an alternative for malaria privation over 12 past months					
My household family has spent money for buying mosquito coils as an alternative for malaria privation over 12 past months.					
My household family has spent money for buying bed sprays as an alternative for malaria privation over 12 past months.					
My household family has spent money for buying drugs as an alternative for malaria treatment over 12 past months.					
My household family has spent money for buying food for ill-person and those taking care of ill-person over 12 past months.					
My household family has spent money for transport at the treatment centre and back home over 12 past months.					

b) The question aims to assess the extent to which household expenditure spent on treatment and prevention of malaria at household family affected the quantity of farm output over 12 past months. You are required to supply your responses from the following alternative answers: 1= Below 5 sacks of farm output, 2= 05 sacks of farm output, 3= 10 sacks of farm output, 4= 15 sacks of farm output, 5= 20 sacks and above.

Item	1	2	3	4	5
How much of farm yield could have been harvested for the amount of money spent for bed splays over 12 past months?					
How much of farm yield could have been harvested for the amount of money spent on buying bed net over 12 past months?					
How much of farm yield could have been harvested for the amount of money spent for buying mosquito coils?					
How much of farm yield could have been harvested for the amount of money spent for buying malaria drugs over 12 past months?					
How much of farm yield could have been harvested for the amount of money spent for buying food for ill-person and taking care of ill-person over 12 past months?					
How much of farm yield could have been harvested for the amount of money spent for transportation costs from home to health center and vice-versa over 12 past months?					

THANK YOU