Empirical Analysis of Economic Burden of Ill-Health on Household Productivity in Nigeria: A Case Study of Kwara State.

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ABSTRACT

This study assessed the economic burden of ill-health on household productivity in Ilorin-West Local Government Area of Kwara State, Nigeria. The study mainly focused on malaria, typhoid fever and malnutrition which are considered as the major infections in the study area. Household Survey Questionnaire (HSQ) was used for data collection and a multi-stage random sampling technique was employed, since the local government area was clustered on the basis of its districts. A total number of 177 households were used for the analysis, using both descriptive and ordinary least square regression techniques.

The study used the cost of illness (COI) approach to assess the burden of ill-health on household productivity. Considering the findings of this study, the results of Ordinary Least Squares showed that there is a long-term negative relationship between burden of ill-health and household productivity. The recommendations include among others the following; there should be interventions in form of mobilizing resources, formulating and implementing policies and programmes that will promote awareness and measures that ensure effective prevention and control of these pandemic diseases. Not only this but also that hospital and clinics should be easily accessible, readily available and affordable to the households in order to meet their health needs and finally, taking some measures against the outbreaks of waterborne diseases through improvements in sewage and waste disposal, as well as provision of safe potable water. Also defecation in the open should be discouraged through provision of toilet facility within the households.

Keywords: Ill-health, Diseases, Cost of Illness, Economic Burden, and Household Productivity,

1. Introduction

Ill-health is an umbrella term used to refer to the experience of disease and illness. Ill -health is defined as illness which is a subjective sensation. Ill- health can also be defined as disease which is a set of symptoms or as a disorder which is a malfunction of a body tissue, organ or system. Ill-health represents a great burden to affected individuals. While it is difficult to quantify, the welfare losses to the individual who is severely ill can be significant, particularly in developing countries such as Nigeria, where there is limited provision of social security and health care. Individuals suffering from illness may be weak, unable to work, unable to provide for children and other dependants. At a more aggregated level, however, it seems likely that a high ill-health burden may have an adverse impact on a country's productivity, growth and, ultimately, economic development (Matthew and Eric, 2005). Improvement in health increases the output not only through labour productivity, but also through the capital accumulation (Bloom et al., 2004). If a disease has a fatal effect on individuals then it will lower the amount of labour supplied (Matthew and Eric, 2005). Diseases have near-fatal consequences, particularly on adults who participate in the labour force. Affected individuals remain in the labour force, but their productivity is severely impaired.

Ill-health burden is a challenge to human development. It is both a cause and consequence of under-development (Felix and Kwadwo, 2003). In Nigeria, ill-health accounts for the major cause of hospitalization and represents about 90 per cent of all avoidable morbidity and mortality in almost all ages and sex groups (Obinna, Reginald and Paul, 2000). It is also the leading cause of mortality in children under five years, a significant cause of adult morbidity, and the leading cause of workdays lost due to illness and diseases. A fall-out has been the lack of drugs in hospital leading to the patronization of quacks by patients coupled with sub-optimal treatment of cases and inappropriate drug consumption (Obinna, Reginald and Paul, 2000). Measures of burden of ill-health which include mortality and recently Disability-Adjusted Life Years (DALYs) have clearly demonstrated the burden of this ill-health. The past efforts of the households and government to ameliorate the burden of ill-health have been insignificant. This could either be due to lack of awareness by the policy makers and households about its devastating socio-economic impact or due to resignation to fate and acceptance of the status quo (Obinna, Reginald and Paul, 2000). Thus, a measure/indicator of ill-health burden that will be clear to both the households and the policy makers has to be used to show whether or not ill-health really impacts badly on the households and by extension, on the national economy.

From the foregoing, it is imperative to carry out an empirical assessment, in monetary terms, of the economic burden of ill health on household productivity. The findings of the study provide useful information to both the policy makers and the households on the economic loss due to illness and diseases (i.e. ill-health). This would motivate all to seek, design, implement and sustain cost-effective control measures that can roll back the illness and dreadful diseases. This study therefore estimated the costs of health threats and evaluates the economic burden of ill-health such as malaria, typhoid fever, and undernourishment (malnutrition) on household productivity. The paper is structured into six sections. Section one is the introduction. Section two contains literature review while theoretical framework is presented in section three. Methodology and analytical framework are discussed in section four while empirical results and discussion of results are presented in section five. The paper is rounded off in section six with policy recommendations and conclusion.

2. Literature Review

Ill-health, in general, deprives households of their health and productivity potential. The burden of ill-health may invariably challenge individual or household income and savings, and compete with investment activities. From countries' perspective, ill-health reduces life expectancy and ultimately economic productivity, thus depleting the quality and quantity of countries' labour force. This may result into lower national output and national income (that is, Gross domestic product, GDP, and Gross national income, GNI respectively). In contrast, good health improves levels of human capital which may in turn, positively affect household productivity and ultimately affect economic growth rates (Lopez-Cassanovas, 2005). Good health increases workforce productivity by reducing incapacity, disability and workdays lost.

Lui, Maniadakis, Gray and Rayner (2002) employed direct health care costs, direct non-health service costs and productivity costs to estimate the economic burden of coronary heart disease in the United Kingdom (UK). The result showed that heart disease cost is a leading public health problem in terms of the economic burden from disease in the UK. Tallinna (2006) adopted a cross-sectional household survey to provide a direct quantitative assessment of the economic effects of ill-health, in particular chronic disease on Estonian economy. The result revealed that poor adult health negatively affects economic well-being at the individual and household level in Estonia. Hong (2008) used longitudinal survey (census data) between 1850 and 1860 to investigate the effects of malaria on wealth accumulation of migrated households into malaria-endemic countries. The author found that the impact of malaria on later health conditions, human capital accumulation, and labour productivity can result in greater long-term economic burdens.

In Africa, series of studies conducted also revealed negative effects of ill-health on productivity. For example, Bachmann and Frederick (2003) adopted household survey with stata software to compare the physical, logistic and economic burdens of illness between households affected by HIV and unaffected neighbouring households, in one rural and one urban area in Free State province, South Africa. The result revealed that members of affected households, compared to members of unaffected households, were independently more likely to be continuously ill, and to die, mainly due to infectious diseases. Chuma, Vincent and Catherine (2010) conducted a cross-sectional household survey by comparing malaria cost burdens in four Kenyan districts of different endemicity. The result showed that there was significant difference in duration of fever, perception of fever severity and cost of fever burdens. Felix and Kwadwo (2003) estimated econometrically a production function for the Gross Domestic Product (GDP) to assess the economic burden of malaria in Ghana. The result showed that from the macroeconomic perspective, an estimated econometric model found malaria to have negative effect on real GDP growth. And that 1per cent increase in the malaria morbidity rate will slow down the rate of real GDP growth by 0.41per cent.

In Nigeria, many authors have also attempted to examine the burdens of various diseases (i.e. ill-health) on economic growth. For example, Ayodele, Oluyemi, Amos and Tuoyo (2007) used willingness to pay (WTP) approach to quantify the economic burden of malaria in Nigeria. The authors found that the malaria burden in Nigeria is enormous and has a devastating impact on economic growth. Ajani and Ashagidigbi (2008) employed stratified random sampling procedure to analyze the effect of malaria on the overall farm income of the rural households in Oyo State. The result showed that low level of awareness, (56per cent) ,use of modern preventive measures (12per cent), poor sanitary conditions, and large household size (8 persons),were the major

factors responsible for the high malaria incidence in the rural household and that the increase in malaria incidence however had a significant effect on the health and farm income of the farmers through increase in the number of days of incapacitation of an average of 22 days and an income loss of N15,231.50 during the days of incapacitation. Lori, John and Nwaorgu (1999) adopted survey method to examine the economic impact of AIDS on households, in agriculture, firms and other economic sectors. The authors found that AIDS had adverse effects on agricultural households, firm and other economic sectors, including loss of labour supply and remittance income. Dele and Anderson (2006) adopted an additional calibration approach to explore and demonstrate the economic impact (cost) of chronic diseases without intervention and the potential economic benefit from interventions to control the burden of chronic diseases in selected countries. The results indicated that the burden of chronic disease poses appreciably greater constraints to economic performance in low and middle income countries.

This study is an improvement on the previous studies on the relationship between economic burden of ill-health and productivity in Nigeria for two reasons. Firstly, this study considered both communicable and non-communicable diseases, with emphasis on major health threats and diseases like malnutrition, malaria and typhoid fever while previous studies were biased towards only one disease such as malaria or HIV/AIDS. Secondly, this present study considered households in general irrespective of their characteristics, but some of the previous studies either focused on people in the most productive age groups, or households in agriculture

3. 3. Theoretical Framework

The study is based on the traditional approach to labour supply theory which is based fundamentally on the idea that each individual has the possibility to make trade-offs between the consumptions of goods and the consumption of leisure (Becker model, 1981). Leisure is defined as time not spent at work. In this study, we defined leisure to include time of ill-health.

Let the utility function of a representative household with population n to be:

$$U = U_i\ (C_i\ ,\ l_i,) \tag{1}$$

Where, U_i is utility of individual *i;* C_i is consumption of individual *i*; and l_i is leisure as defined in the traditional approach of individual *i.*

Re-specifying equation (1) to include ill-health (that is time not spent at work due to ill-health) yields;

$$U = U_i\ (C_i\ , h_i,\ l_i) \tag{2}$$

Where, h_i is ill-health of individual *i* in the household.

The ill-health function for each household member is given by;

$$h_i = h_i(\ B, D, S\ ) \tag{3}$$

Where *B* denotes burden of ill-health, *D* denotes distance from where ill individual lives and where to receive treatment, *S* denotes household size.

The household also faces a full income constraint which is derived from time and income constraint $\sum_{j=1}^{m}\sum_{i=1}^{n}P_j c_i + \sum_{j=1}^{m}\sum_{i=1}^{n}B_j h_i + \sum_{i=1}^{n} wl_i = M$ (4)

Where P_j is the price of goods *j;* j=1…m

B_J is the burden of ill-health, j=1…m

W is the wage rate, l_i is leisure time of individual *i* and M is money income.

The household therefore maximizes the utility function subject to given constraint. The lagrangian function is given as:

$$\mathbf{L} = U\,(C_i\,, h_i,\ l_i) + \boldsymbol{\lambda}\,(\mathrm{M} - \sum_{j=1}^{m}\sum_{i=1}^{n}P_j c_i + \sum_{j=1}^{m}\sum_{i=1}^{n}B_j h_i + \sum_{i=1}^{n} wl_i\,)$$

$$+ \mu(h_i(B, D, S,)) \quad (5)$$

The first order conditions;

$$\frac{\partial L}{\partial C} : \frac{\partial U}{\partial C} - \boldsymbol{\lambda} \sum_{j=1}^{m} P_j = 0 \quad (6)$$

$$\frac{\partial L}{\partial h} : \frac{\partial U}{\partial h} - \boldsymbol{\lambda} \sum_{j=1}^{m} B_j + \mu = 0 \quad (7)$$

$$\frac{\partial L}{\partial l} : \frac{\partial U}{\partial l} - \boldsymbol{\lambda} w = 0 \quad (8)$$

Equation (7) and (8) are balanced and become;

$$\mathrm{U}_h = \boldsymbol{\lambda} \sum_{j=1}^{m} B_j + \mu \quad (9)$$

$$\mathrm{U}_l = \boldsymbol{\lambda}\mathrm{w} \quad (10)$$

Divide equation (9) by (10) and cross multiply, this gives

$$\mathrm{U}_h\ \mathrm{w} = \mathrm{U}_l \sum_{j=1}^{m} B_j + \mu \quad (11)$$

Divide equation (11) through by U_h and become

$$w = \frac{U_l \sum_{j=1}^{m} B_j}{U_h} + \frac{\mu}{U_h} \quad (12)$$

Let the RHS of equation (12) represents ill-health burden denoted by B while w denotes wage.

$$w = B \quad (13)$$

Since productivity is measured by income loss due to incapacitation of household, wage therefore is proxied by household productivity and as a function of ill-health burden, it is expressed as;

$$HHP = f(B) \quad (14)$$

4. Methodology

4.1 Model Specification

Following from equation (14), the empirical model for this study can be fully specified according to each of the diseases as thus:

$$HHP = \alpha_0 + \alpha_1 DMCOST + \alpha_2 INDICOST + \alpha_3 HHSMAL + \alpha_4 DISMAL + \mu \quad (15)$$

$$HHP = \alpha_0 + \alpha_1 DITYPO + \alpha_2 INDITYPO + \alpha_3 HHSTYPO + \alpha_4 DISTYPO + \mu \quad (16)$$

$$HHP = \alpha_0 + \alpha_1 DCOMAN + \alpha_2 INCOMAN + \alpha_3 HHSMAN + \alpha_4 DISMAN + \mu \quad (17)$$

Where HHP represents household productivity, DMCOST and INDICOST denote direct and indirect costs of malaria, DITYPO and INDITYPO denote direct and indirect costs of typhoid fever, while DCOMAN and INCOMAN denote direct and indirect costs of malnutrition. DISMAL, DISTYPO and DISMAN denotes distance to get treatment for malaria, typhoid and malnutrition. Finally, HHSMAL, HHSTYPO and HHSMAN denote household size for malaria, typhoid fever and malnutrition infected households.

Therefore, the objectives of the paper are achieved by estimating equations (15), (16) and (17) above.

4.2 Analytical Framework

This study draws on the human capital theory, which has been widely used to assess the productivity losses from illness or injury as measured by income forgone due to morbidity, disability and mortality. The best approach for this study is the cost of illness (COI) approach. This is meant to assess the economic burden of ill-health on household productivity which translates into loss of income and finally poverty. The cost of illness (COI) method is the summation of the direct cost of illness and the indirect cost of illness. The direct cost of illness includes all out of pocket expenses from the entire household during an attack of malaria, typhoid fever or malnutrition. The indirect cost of illness on the other hand is the opportunity cost of time lost due to sickness and care giving. The time cost is defined as the sum of the

opportunity cost of wages forgone by the sick individual due to illness, and the opportunity costs of healthy household members' time spent on treating or attending to the sick person or accompanying them for treatment.

4.3 Sampling Technique and Type of Data

The sample unit for this study is households. Multi-stage random sampling technique which comprises both simple random and cluster sampling techniques were employed for the research survey. The local government area is clustered into four on the basis of its districts namely Ajikobi, Warrah-Osin, Alanamu and Magaji Ngeri, while the local government area has twelve (12) wards. Fifty (50) households were selected at random from each of the districts. This gives a total sample size of 200 respondents. Structured questionnaires as well as personal interviews were used as data collection instruments. The data collected were based on socio-economic characteristics and also on incidence of morbidity of malaria, typhoid fever and malnutrition, including information on how much they spend in protecting themselves against any of these illness; how much they spend in treating any of these diseases and their choice of health-care provider, among others.

4.4 Method of Analysis

Generally, Income loss is estimated through dividing household income per month by 20 working days in a month and multiplying by number of sick days. The study applied both statistical and quantitative methods to analyze the data collected. Statistical methods like simple descriptive statistics which includes a measure of central tendency such as mean, percentages, frequency distribution and tabulation of data. The quantitative section of this study applies Ordinary Least Square (OLS)Regression technique.

5. Empirical Results and Discussion

5.1 Disease Infection

Table 5.1 reveals that overwhelming majority of household respondents 93.4per cent in Ilorin-West had only one household member being infected by any of these diseases, while the remaining 6.6per cent of the household respondents had two household members infected. The average number of household member being infected by any of malaria, typhoid or malnutrition in Ilorin-West was 1.03, implying that at least one member in each of the household was infected by any of the diseases. Table 5.2 showed the percentage of household members in Ilorin-West Local Government Area that were infected by malaria, typhoid fever and malnutrition. The household members that were infected by only malaria weighted 61.8per cent. About 21per cent of household members were infected by typhoid fever only, while about 12 per cent of the households were affected by malnutrition only. However, percentage composition of the households with more than one member being infected by more than one disease was about 2.2per cent for malaria and typhoid fever, 41.1per cent for malaria and malnutrition, and 2.6per cent for typhoid fever and malnutrition. The results revealed that malaria was the most common disease among the households. This was followed by typhoid fever.

Table 5.1: Distribution of Household Members Infected by Diseases

Number of Household members infected by diseases	Frequency	Total Individuals Infected by Diseases	Valid percent	Cumulative percent
One household member (1)	171	171	93.4	93.4
Two household members (2)	6	12	6.6	100
Total	177	183	100	
Average = 1.03				

Source: Field Survey, 2011.

Table 5.2: Distribution of Household Members Infected By Malaria, Typhoid Fever and Malnutrition

Infected Diseases	Frequency	Percentage	Cumulative percent
Malaria only	113	61.8	61.8
Typhoid only	38	20.8	82.6
Malnutrition only	21	11.5	94.1
Malaria and Typhoid	4	2.2	96.3
Malaria and Malnutrition	2	1.1	97.4
Typhoid and Malnutrition	5	2.6	100
Total	183	100	

Source: Field Survey, 2011

5.2 Sources of Treatment.

Table 5.3 showed that 8.5per cent of infected household members did not source for any treatment in the first instance. This may be due to lack of money to pay for treatment of diseases. Those that opted for self- medication recorded 41.2per cent. The results showed that self-medication was the most common source of first treatment. This was followed by clinic and hospital. The preponderance of self-medication as the source of first treatment may also be

attributed to lack of money to seek for more effective source of treatment. Furthermore, those that opted for herb usage among the infected household members constituted 18.1per cent while those that opted for clinic and hospital as first source of treatment constituted 32.2per cent.

Table 5.3: Distribution of Infected household Members by Sources of First Treatment.

Sources of first Treatment	Frequency	Percentage	Cumulative percent
Do nothing	15	8.5	8.5
Self-medication	73	41.2	49.7
Use Herbs/Spiritualists	32	18.1	67.8
Clinic/Hospital	57	32.2	100
Total	177	100	

Source: Field Survey, 2011.

5.3 Direct Costs of Infection of Malaria, Typhoid Fever and Malnutrition

Table 5.4 revealed the direct costs incurred by households on the treatment of malaria, typhoid and malnutrition infections. For malaria treatment, households that opted for spiritualist/herbalist incurred a maximum cost of N7, 400, and a minimum cost of N100, while the average cost was N300.59 within the period of incapacitation. Concerning households that opted for self-medication, the maximum cost incurred was N2,600; minimum cost was N70, while the average cost incurred was N330.35. Among those households that visited clinic/hospital the maximum cost incurred was N13,700; minimum cost was N250, while the average cost incurred was N1,940.50.

For typhoid treatment, households that visited spiritualist/herbalist incurred average cost of N270. The maximum cost incurred among them was N2,360 while the minimum cost was N250. Regarding households that opted for self- medication, the average cost incurred was N361.16, maximum cost wasN3,260, while the minimum cost was N170 . Among households that made use of clinic/hospital the average cost spent was N2,848.95, the maximum cost incurred was N9,500; while the minimum cost was N240. Concerning the treatment of malnutrition, households that opted for spiritualist/herbalist incurred an average cost of N417.50, the maximum cost incurred was N1,480; while the minimum cost was N430 . Among the households that opted for self- medication, maximum cost incurred was N1,500; minimum cost was N80 while the average cost incurred was N339.25. Finally, among the households that made use of clinic/hospital, the maximum cost incurred was N6,400; minimum cost incurred was N560 while the average costs incurred was N2030.42. One important inference that can be drawn from the results shown by Table 5.4 is that, on the average, the household member that opted for clinic and hospital for treatment of any of the three categories of diseases incurred the highest average direct cost.

Table 5.4: Direct Costs of Malaria, Typhoid Fever and Malnutrition

Infections	Health Care Choices (including transportation cost and other charges)	Maximum Costs Incurred	Minimum Costs Incurred	Average Costs Incurred
Malaria	Spiritualist/Herbalist(17)	N7,400.00	N100.00	N300.69
	Self-Medication(4)	N2,600.00	N70.00	N330.35
	Clinic/Hospital(95)	N13,700.00	N250.00	N1,940.50
Typhoid fever	Spiritualist/Herbalist(17)	N2,360.00	N250.00	N270.00
	Self-Medication(4)	N3,620.00	N170.00	N361.16
	Clinic/Hospital(22)	N9,500.00	N240.00	N2,848.95
Malnutrition	Spiritualist/Herbalist(3)	N1,480.00	N430.00	N417.50
	Self- Medication(4)	N1,500.00	N80.00	N339.25
	Clinic/Hospital(17)	N6,400.00	N560.00	N2,030.42

Source: Author's computation, 2011. Note: Figures in parentheses are the number of Respondents.

5.4 Indirect Costs of Infections of Malaria, Typhoid Fever and Malnutrition

From Table 5.5, it is revealed that households incurred an indirect cost which is measured in terms of time lost due to illness. For malaria treatment, households that opted for spiritualist/herbalist lost 40minutes which was the maximum, for treatment or giving care, minimum was 5minutes while 4minutes was the average. Households that opted for self-medication lost maximum of 50minutes, minimum of 5minutes and an average of 6minutes. Households that visited clinic/hospital for treatment spent a maximum of 35.4hours which is equivalent to 1 day and 12hours, a minimum of 5minutes and an average of 3.2hours within the period of incapacitation. For typhoid treatment within this period, households that opted for spiritualist/herbal use, lost a maximum of 30minutes, minimum of 6minutes and an average of 5minutes. Households that used self- medication lost a maximum of 25minutes, minimum of 5minutes and average of 4minutes. Households that received treatment from clinic/hospital lost a maximum of 14hours, minimum of 30minutes and an average of 3.6hours within the period of incapacitation. Lastly, for malnutrition treatment and care giving within this period, households that visited spiritualist/herbalist lost a maximum of 45minutes, minimum of 12minutes and average of 8minutes. Those households that patronized medicine store for buying drugs lost a maximum of 30minutes, minimum of 5minutes and average of 7minutes. Finally, households that made use of clinic/hospital for treatment or care giving lost a maximum of 7hours, minimum of 25minutes and an average of 1.2hours within the period of incapacitation.

Table 5.5: Indirect Costs of Malaria, Typhoid Fever and Malnutrition

Infections	Health Care Choices (including transportation time and other time spent)	Maximum Time Spent (minutes)	Minimum Time Spent (minutes)	Average Time Spent (minutes)
Malaria	Spiritualist/Herbalist(17)	40mins	5mins	4mins
	Self- Medication(4)	50mins	5mins	6mins
	Clinic/Hospital(95)	50,904mins	14mins	4,556mins
Typhoid fever	Spiritualist/Herbalist(17)	30mins	6mins	5mins
	Self- Medication(4)	25mins	5mins	4mins
	Clinic/Hospital(22)	20,190mins	30mins	5,185mins
Malnutrition	Spiritualist/Herbalist(3)	45mins	12mins	8mins
	Self- Medication(4)	30mins	5mins	7mins
	Clinic/Hospital(17)	10,080mins	25mins	1,757mins

Source: Authors' Computation, 2011

More importantly, one can deduce from the results presented in Table 5.5 that, on the average, the household member that opted for clinic and hospital for treatment of any of the three categories of diseases incurred the highest average in-direct cost which was measured by the time spent on receiving treatment during the period of incapacitation.

5.5 Interpretation of Regression Analysis

Table 5.6 summarized the results of the regression analysis. Firstly, in the malaria model, the estimated results revealed that direct cost of malaria (DMCOST) has a negative relationship with household productivity. This follows that the higher the direct cost of Malaria, the lower the household productivity. This implies that the higher cost of malaria will impinge on the available fund to make profitable investment on productive activity. This follows the a'priori expectation because household member only need to reduce his/her cost on ill-health treatment so as to expand his/her investment in productive activity. The indirect costs of malaria (INDICOST) and distance to get health care treatment (DISMAL) have a positive relationship with household productivity. This is not in line with the a'priori expectation. Plausible reasons for this finding is the observed high level of awareness and adoption of preventive measures against malaria infection such as mosquito treated nets in the study area and the current improvement on the effort of government to combat and eradicate malaria and other diseases in Nigeria. This has created opportunities for households infected with diseases such as malaria to seek for modern health facilities like malaria preventive facilities as well as facilities for treatment of malaria infections regardless of the distance involved. This finding conformed to the findings of the

National Bureau of Statistics (NBS), (2013), who found that in 2012, there was an upward trend in the availability and use of Insecticides Treated Nets (ITNs) among the households in Nigeria.

Table 5.6: The Results of the Regression Analysis.

Forms of equation	Dependent Variable	Constant	Regression Coefficients of the Explanatory Variables.					
			DMCOST DITYPO DCOMAN	INDICOST INDITYPO INCOMAN	DISMAL DISTYP DISMAN	HHSMAL HHSTYP HHSMAN	R^2	F
Linear model (Malaria illness)	HHP	399.769	-0.216* (-4.139)	0.496* (28.735)	62.707 (1.354)	9.475 (0.165)	0.837	221.1
Semi-log (Typhoid fever)	HHP	1611.961	-229.4927 (-0.989)	-525.3880* (6.021)	- 259.1401** (-2.274)	122.040** (-2.167)	0.620	11.85
Semi-log (Malnutrition	HHP	-17295.37	4396.528** (2.722)	-1141.997** (-2.135)	-118.0082 (-0.116)	-6889.067** (-2.245)	0.457	3.161

Source: Authors' Computations. Note: Figures in the parentheses are the t-values. *Significant at1%, **Significant at 5% level.

NBS (2013) also found that the number of households who have at least one insecticide treated net was 43.8 per cent, while children under-five and pregnant women who slept under treated nets were about 34.6 per cent and 30.3 per cent, respectively. The number of children under-five who slept under ITNs rose astronomically by about 32.4 per cent and 29.1 per cent when compared with 2003 and 2008. Lastly, the household size (HHSMAL) has a positive relationship with household productivity. This also conformed to theoretical expectation because households with larger size usually engage some of the members in their productive activities so that their productivity will not be impaired.

The estimated results showed that the variables on direct costs, indirect costs were statistically significant in explaining the changes in household productivity. However, household size and distance covered in getting access to treatment were not statistically significant in explaining changes in household productivity. For instance, a unit increase in naira spent (expenditure incurred on malaria treatment and care giving) will bring about productivity loss (i.e., loss of income) by value of 0.22kobo. Furthermore, a unit increase in number of hours or minutes spent on giving care or receiving treatment against malaria infection by the households will improve productivity loss, that is, los in income by 0.50kobo. The magnitude of the F-statistics revealed that the model was statistically significant. The co-efficient of determination (R^2) showed that the explanatory variables jointly accounted for 84 percent changes in household productivity. This also showed that the model produced a good fit for the data.

Secondly, in the typhoid fever model, the estimated results showed that direct costs of typhoid fever (DITYPO), indirect cost of typhoid fever (INDITYPO) and distance to get health care (DISTYP)have a negative relationship with household productivity. This is in line with the apriori expectation. Similarly, the household size (HHSTYP) has a positive relationship with household productivity. This also conformed to the a'priori expectation because household with

larger size usually engages in division of labour, such that the productive activities of sick members will be covered and productivity will not be impaired. The estimated results showed that the variables on indirect costs of typhoid, household size and distance to get typhoid fever care are statistically significant in explaining changes in productivity loss. However, direct cost of typhoid fever was not statistically significant in explaining changes in productivity loss. For instance, a percentage increase in number of hours or minutes spent for given care or receiving treatment against typhoid fever by the households will bring about a loss of income by N525. Also, a percentage increase in the distance covered by the household to seek for treatment or giving care against typhoid fever will bring about income loss by N259. Lastly, a percentage increase in household size will bring about an improvement in income or productivity by N122.The result of the F-statistics showed that the model was statistically significant. The co-efficient of determination (R^2) revealed that 62 percent of the change that occurred in the dependent variables can be explained by the explanatory variables. This also confirmed that the model produced a good fit for the data.

Thirdly, in the malnutrition model, the estimated results revealed that direct cost of malnutrition (DCOMAN), indirect cost of malnutrition (INCOMAN) and distance to get health care treatment against malnutrition infection (DISMAN) have a negative relationship with household productivity. This follows the a'priori expectation. However, household size (HHSMAN) has a negative relationship with household productivity which conformed to theoretical expectation because household with larger size will tend to be more malnourished and thus vulnerable to diseases. In this way, they have the tendency to cause loss of productivity or income.

The estimation results revealed that the variables on direct costs of malnutrition, indirect costs of malnutrition and household size are statistically significant in explaining changes in household productivity. For instance, a percentage increase in money spent (direct expenses incurred for malnutrition treatment) will bring about productivity loss (i.e., income loss) by N436. Also, a percentage increase in number of hours or minutes spent by households for giving care or receiving treatment against malnutrition will bring about income loss by N14. Lastly, a percentage increase in household size will lead to income loss by N89. The result of the F-statistics showed that the model was statistically significant. The co-efficient of determination (R^2) revealed that the explanatory variables jointly accounted for 46 percent changes in household productivity. This means that the regression result revealed about 46 percent of the variability in the household productivity. This was accounted for by direct costs of malnutrition, indirect costs of malnutrition and household size.

6 Policy Recommendations and Conclusion

Following the results of the analysis above, it is clearly shown that there is a long-term negative relationship between burden of ill-health and household productivity. Ill-health presents significant costs to the affected households since it is possible to have constant experience within a short–period of time. The aggregated effects on the economy could however be substantial.

It is therefore important that policies that seek to reduce the burden of ill-health take such issues into consideration. Against this background, some policy recommendations that can be deduced from this study include:

I. In the face of increasing cost of illness there is need for a strong collaboration among major stakeholders including the Government, Non-Governmental Organizations and more importantly the communities. Every effort must be made by all the stakeholders to look for effective and cost saving methods of prevention and treatment.

II. There should be interventions in form of mobilizing resources, formulating and implementing policies and programmes that will promote awareness and measures that ensure effective prevention and control of these pandemic diseases.

III. Hospitals and clinics should also be easily accessible, readily available and affordable to the households in general in order to meet their health needs. When the cost is affordable the burden of ill-health would be reduced. In this way, loss in productivity will be reduced.

IV. Medication that can reduce the days of incapacitation should be intensified and made available to households at affordable prices in order to improve the quality of life and productivity of households.

V. Some control measures should be taken against the outbreaks of water-borne diseases by improvements in sewage and waste disposal, as well as provision of safe potable water. Where pipe water is not feasible, provision of bore holes is useful.

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