Empirical Analysis of Economic Burden of Ill-Health on Household Productivity in Nigeria.

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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 used cost of illness approach to evaluate the burden of malaria, typhoid fever and malnutrition which are considered as the major infections in the study area. 177 households were selected through multi-stage random sampling technique and household survey questionnaire (HSQ) was used for data collection. The data were analyzed using both descriptive and ordinary least square regression techniques.

The results showed that households incurred an average cost of ₦300.69 to spiritualist, ₦330.35 to self-medication and ₦1,940 to clinic for malaria treatment. For typhoid fever treatment, households spent an average cost of ₦270 to spiritualist, ₦361.16 for self-medication and ₦2,848.95 for clinic, while for malnutrition treatment within the period of incapacitation; households incurred an average cost of ₦417.50 to spiritualist, ₦339.25 for self-medication and ₦2,030.42 for clinic. While at the same time households lost an average of 4 minutes to get treatment against malaria from spiritualist, 6 minutes for self-medication and 4,556 minutes for clinic. For typhoid, households lost an average of 5 minutes to get treatment from spiritualist, 4 minutes for self-medication and 5,185 minutes at clinic. Finally, for malnutrition treatment, households lost an average of 8 minutes for spiritualist, 7 minutes for self-medication and 1,757 minutes for clinical treatment. Analysis of regression results showed that there is a long-term negative relationship between burden of ill-health and household productivity.

There is therefore the need for 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.

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

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.[13] 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.[19] 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.[19] Improvement in health increases the output not only through labour productivity, but also through the capital accumulation.[8] If a disease has a fatal effect on individuals then it will lower the amount of labour supplied.[19] 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.

In Nigeria, ill-health accounts for the major cause of hospitalization and represents about 90 percent of all avoidable morbidity and mortality in almost all ages and sex groups.[22] 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. Approximately 50% of the Nigeria population experience at least one episode of malaria per year.[29-30] Malaria in particular is responsible for over 90% of reported cases of tropical disease in Nigeria which suggests that it could be the largest contributor to total disease burden and productivity losses resulting from major tropical diseases in the country.[3] Also, the prevalence of these dreadful diseases account for about 61.67%, 14.17% and 55.9% for malaria, typhoid fever and malnutrition respectively of all reported cases of ill-health in Kwara State.[1, 28]

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.[22] 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.[22] 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.[22] 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 evaluated the impact of malaria, typhoid fever and malnutrition on household productivity. It also estimated their cost of health threats. 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.

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.[17] 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.[17] Good health increases workforce productivity by reducing incapacity, disability and workdays lost. Liu, Maniadakis, Gray and Rayner[16] 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[27] 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[14] 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[12, 15, 18, 20, 25] also revealed negative effects of ill-health on real GDP growth. For example, Munongo[20] used Ordinary Least Squares and two-stage Instrumental variable estimation methods to estimate the impact of ill health on productivity and labour supply in Uganda found that poor health of productive labour force leads to productive loss and negatively impacts economic growth through reduced economic output due to work absenteeism. A similar approach was also employed to examine the wage and labour supply effects of illness in Cote d'Ivoire and Ghana and the results revealed that for one additional disabled day, the estimated impact on annual earnings is about 65% reduction in Cote d'Ivoire and 32% reduction in Ghana.[25]

Using cost of illness approach, studies have also shown the costs burden associated with ill-health. For instance, the household economic cost of malnutrition among children between the ages of zero and five years in Zimbabwe showed that that households incurred direct costs amounting 36.75 US$, which is equivalent to 24% of monthly household income while caretakers lost an average of 11 working days - an amount equivalent to 31% of household monthly income.[26] In Rwanda, the average cost of each of the 1,722,271 reported malaria cases in 1989 was $11.82: $2.58 in direct and $9.24 in indirect cost while the direct cost per case is equal to 160% of the per capita budget of the Ministry of Health.[11] In an incidence-based cost-of-illness analysis employed in Tanzania to estimate the economic burden of typhoid fever indicated that even though the average societal cost for treatment alone was US$ 154.47 per typhoid episode but the major expenditure was productivity cost due to lost wages of US$ 128.02 (83%).[4]

In Nigeria, many authors have also attempted to examine the burdens of ill-health on economic growth. For example, Onuche[24] used of descriptive statistics and production function to analyze the impact of ill-health on agricultural outputs in Nigeria. The result revealed that the number of days of farm work lost to ill-health has a negative relationship with agricultural output. Egbetokun, Omonona and Oluyole[10] who in their studies employed regression analysis to examine the effects of sickness on labour productivity found that land area cultivated by farmers and weight of seeds planted directly affect labour productivity while proportion of days lost by farmers due to sickness and educational qualification have negative effects. Olalekan and Nurudeen[23] used cost of illness approach to evaluate the burden of malaria in Nigeria. The results indicated that that the total cost of malaria illness in Nigeria was estimated to be about ₦2,231.34 billion representing 7.3 percent of the GDP in 2011. Ajani and Ashagidigbi[2] who in their studies analyzed the effect of malaria on the overall farm income submitted that malaria incidence 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 ₦15, 231.50. Ayodele, Oluyemi, Amos and Tuoyo[5] however used willingness to pay (WTP) approach to quantify the economic burden of malaria in Nigeria also found that the malaria burden has a devastating impact on economic growth.

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

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.[7]

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

$$U = U_i \left(C_i, \quad l_i, \right) \; - - - - - - - - - - - - (1)$$

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;

$$U = U_i(C_i,\ h_i,\ l_i)\ -----------(2)$$

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

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

$$h_i = h_i(B, D, S) -------------- (3)$$

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

$$\sum_{j=1}^{m}\ \sum_{i=1}^{n} P_j c_i + \sum_{j=1}^{m}\ \sum_{i=1}^{n} B_j h_i + \sum_{i=1}^{n} w l_i = M ---(4)$$

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:

$$L = U(c_i, h_i, l_i) + \lambda \sum_{j=1}^{m}\ \sum_{i=1}^{n} P_j c_i + \sum_{j=1}^{m}\ \sum_{i=1}^{n} B_j h_i + \sum_{i=1}^{n} w l_i$$
$$+ \mu\big(h_i(B, D, S)\big) ------- (5)$$

The first order conditions;

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

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

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

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

$$U_h = \lambda \sum_{j=1}^{m} B_j + \mu ------------ (9)$$

$$U_l = \lambda W --------------- (10)$$

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

$$U_h W = U_l \sum_{j=1}^{m} B_j + \mu ----------- (11)$$

Divide equation (11) through by U_h and become

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

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

$$W = B ------------------ (13)$$

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;

$$HHP = f(B) -------------- (14)$$

Methods

Model Specification

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

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

$$HHP = \alpha_0 + DITYPO + \alpha_2 INDITYPO + \alpha_3 HHTYPO + \alpha_4 DISTYPO + \mu ----- (16)$$

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

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 impact objective of this paper is achieved by estimating equations (15), (16) and (17) above.

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. This framework is meant to estimate the direct and indirect costs of each of the illness considered in the paper.

Sampling Technique and Type of Data

The sample unit for this study is households. The household units surveyed for this study include family members, who may work or live most of their time away from the household, but who are significantly contributing e.g. financially to the household spending and savings, and who also have a close family connection to at least one permanent household member. For example, a husband or close relative who is working and living at a distant location, but who is sending money home to its family or household . Household as cited in [6] was defined and characterized as an individual, or group of persons who, on the average, occupy a common dwelling (or part of it), provide themselves jointly with food and other essentials for living.

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.

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 with the aid of Eview software.

Results

Disease Infection

Table 1 reveals that overwhelming majority of household respondents 93.4 percent in Ilorin-West had only one household member being infected by any of these diseases, while the remaining 6.6 percent 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 1: Distribution of Household Members Infected by Diseases

Number of Household members Infected by Diseases	n=183 (%)	Cumulative percent
One household member (1)	171 (93.4)	93.4
Two household members (2)	12 (6.6)	100
Average = 1.03		

Source: Field Survey, 2011.

Table 2 shows 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 61.8 percent. About 21 percent of household members were infected by typhoid fever only, while about 12 percent 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 2.2 percent for malaria and typhoid fever, 41.1 percent for malaria and malnutrition, and 2.6 percent 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 2: Distribution of Household Members Infected By Malaria, Typhoid Fever and Malnutrition

Infected Diseases	n=183 (%)	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

Source: Field Survey, 2011

Sources of Treatment

Table 3 shows that 8.5 percent 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 41.2 percent. 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 18.1 percent while those that opted for clinic and hospital as first source of treatment constituted 32.2 percent.

Table 3: Distribution of Infected household Members by Sources of First Treatment.

Sources of first Treatment percent	n=177 (%)	Cumulative
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

Source: Field Survey, 2011

Direct Costs of Infection of Malaria, Typhoid Fever and Malnutrition

Tables 4 reveals 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 ₦7,400, and a minimum cost of ₦100, while the average cost was ₦300.59 within the period of incapacitation. Concerning households that opted for self-medication, the maximum cost incurred was ₦2,600; minimum cost was ₦70, while the average cost incurred was ₦330.35. Among those households that visited clinic/hospital the maximum cost incurred was ₦13,700; minimum cost was ₦250, while the average cost incurred was ₦1,940.50.

For typhoid treatment, households that visited spiritualist/herbalist incurred average cost of ₦270. The maximum cost incurred among them was ₦2,360 while the minimum cost was ₦250.

Regarding households that opted for self-medication, the average cost incurred was ₦361.16, maximum cost was ₦3,260, while the minimum cost was ₦170. Among households that made use of clinic/hospital the average cost spent was ₦2,848.95, the maximum cost incurred was ₦9,500; while the minimum cost was ₦240. Concerning the treatment of malnutrition, households that opted for spiritualist/herbalist incurred an average cost of ₦417.50; the maximum cost incurred was ₦1,480; while the minimum cost was ₦430. Among the households that opted for self- medication, maximum cost incurred was ₦1,500; minimum cost was ₦80 while the average cost incurred was ₦339.25. Finally, among the households that made use of clinic/hospital, the maximum cost incurred was N6, 400; minimum cost incurred was ₦560 while the average costs incurred was ₦2030.42. One important inference that can be drawn from the results shown by Table 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 4: Direct Costs of Malaria, Typhoid Fever and Malnutrition

Infections	Health Care Choices (including transportation time and other time spent)	Maximum Cost Incurred (naira)	Minimum Cost Incurred (naira)	Average Costs (naira)
Malaria	Spiritualist/ Herbalist (17)	7,400.00	100	300.69
	Self-Medication (4)	2,600.00	70	330.3
	Clinic/ Hospital (95)	13,700.00	2500	1,940.50
Typhoid fever	Spiritualist/ Herbalist (17)	2,360.00	250	270
	Self-Medication (4)	3,620.00	170	361.16
	Clinic/ Hospital (22)	9,500.00	240	2,848.95
Malnutrition	Spiritualist/ Herbalist (3)	1,480.00	430	417.5
	Self-Medication (4)	1,500.00	80	339.25
	Clinic/ Hospital (17)	6,400.00	560	2,030.42

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

Indirect Costs of Infections of Malaria, Typhoid Fever and Malnutrition

From Table 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 40 minutes which was the maximum, for treatment or giving care, minimum was 5 minutes while 4 minutes was the average. Households that opted for self- medication lost maximum of 50 minutes,

minimum of 5 minutes and an average of 6 minutes. Households that visited clinic/hospital for treatment spent a maximum of 35.4 hours which is equivalent to 1 day and 12 hours, a minimum of 5 minutes and an average of 3.2 hours within the period of incapacitation. For typhoid treatment within this period, households that opted for spiritualist/herbal use, lost a maximum of 30 minutes, minimum of 6 minutes and an average of 5 minutes. Households that used self- medication lost a maximum of 25 minutes, minimum of 5 minutes and average of 4 minutes. Households that received treatment from clinic/hospital lost a maximum of 14 hours,

minimum of 30 minutes and an average of 3.6 hours within the period of incapacitation. Lastly, for malnutrition treatment and care giving within this period, households that visited spiritualist/herbalist lost a maximum of 45 minutes, minimum of 12 minutes and average of 8 minutes. Those households that patronized medicine store for buying drugs lost a maximum of 30 minutes, minimum of 5 minutes and average of 7 minutes. Finally, households that made use of clinic/hospital for treatment or care giving lost a maximum of 7 hours, minimum of 25 minutes and an average of 1.2 hours within the period of incapacitation.

Table 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)	40	5	4
	Self-Medication (4)	50	5	6
	Clinic/ Hospital (95)	50,904	14	4,556
Typhoid fever	Spiritualist/ Herbalist (17)	30	6	5
	Self-Medication (4)	25	5	4
	Clinic/ Hospital (22)	20,190	30	5,185
Malnutrition	Spiritualist/ Herbalist (3)	45	12	8
	Self-Medication (4)	30	5	7
	Clinic/ Hospital (17)	10,080	25	1,757

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.

Interpretation of Regression Analysis

Table 6 summarizes 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. One plausible reason for this is the current improvement on the effort of government to combat and eradicate malaria and other diseases in Nigeria. This has made it possible for households infected with malaria to have easy access to malaria preventive facilities as well as facilities for treatment of malaria infections. Also, this could be connected with the observed high level of awareness and adoption of preventive measures against malaria infection such as mosquito treated nets in the study area. The study findings conformed to the findings of NBS,[21] 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. NBS[21] also found that the number of households who have at least one insecticide treated net was 43.8 percent, while children under-five and pregnant women who slept under treated nets were about 34.6 percent and 30.3 percent, respectively. The number of children under-five who slept under ITNs rose astronomically by about 32.4 percent and 29.1 percent 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 0.22 kobo. 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 0.50 kobo. 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 a'priori 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 ₦525. 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

₦259. Lastly, a percentage increase in household size will bring about an improvement in income or productivity by ₦122.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 ₦436. 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 ₦14. 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.

Table 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	339.769	-0.216* (0.052) -4.139	0.496* (0.017) 28.735	62.707 (46.304) 1.354	9.475 (57.402) 0.165	0.837	221.1
Semi-log (Typhoid fever)	HHP	1611.961	-229.4927 (231.846) -0.989	-525.3880* (87.263) 6.021	-259.1401** (113.947) -2.274	122.040** (518.141) -2.167	0.620	11.85
Semi-log (Malnutrition)	HHP	-17295.4	4396.528** (1614.974) 2.722	-1141.997** (534.8237) -2.135	-118.0082 (1013.57) -0.116	-6889.067** (3068.86) -2.245	0.457	3.161

*Source: Authors' Computations. Note: Figures in the parentheses are the standard errors and those below them are the t-value. *Significant at1%, **Significant at 5% level.*

Discussion

The discussion is based on the results arrived at from the analysis of data. From the results obtained for malaria model, only the direct costs of malaria appears to have negative co-efficient. This result strictly agrees with the theory and as well consistence with the findings of,[2, 5] except for indirect costs of malaria. Distance to get health care has positive coefficient and does not agree with the theory, while household size also has positive coefficient though agree with the theory.

From the results obtained for typhoid fever model, direct costs of typhoid fever, indirect costs of typhoid fever and distance to get care for typhoid treatment have negative co-efficient. This result strictly conforms with the theory and also agrees with the studies of,[4, 19] who submitted that typhoid fever is not only limited to absenteeism, but also make the affected individuals to be largely incapacitated and highly dependent.

From the results obtained for malnutrition model, direct and indirect costs of malnutrition, and distance to get care for malnutrition treatment have negative co-efficient and they are conform to the theory, with the exception of household size.

Finally, this result appears to be consistent with the studies of,[26] who argued that severe acute malnutrition imposes a significant economic burden on households in Zimbabwe.

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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