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Malaria Treatment Cost in Ondo State: Private and Public Hospitals Bills Compared

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ABSTRACT

Ondo State is one of the States in Nigeria that have taken significant action to reduce the burden of malaria. Specifically, the State currently runs a free health care programme for infants and pregnant mothers as the disease account for most of the maternal and infant deaths record in the country. Given the prevalence of malaria in the morbidity and mortality incidence of Nigeria and the public health care problem it poses, this study attempts to estimate the cost disparity in malaria treatment in private and public hospitals in Ondo State. Using the morbidity statistics of 85249 malaria patients' visit to public hospitals in Ondo State between 2008 and 2013, and responses of 245 patients who had been treated of malaria in public and private hospitals, the finding showed the average cost of treatment to be higher in the private than the public hospitals. The minimum cost for treating malaria in the private and public hospitals were estimated as N1727 and N1203 for the non complicated case and N8900 and N4850 for the complicated cases respectively in the two hospital types. The disparity between the cost groups was observed to be more pronounced in complicated malaria cases. The wide disparity between costs of treatment in the two hospital types worsens the disease burden in the economy. The study suggests narrowing the gap between the treatment costs in the private and public hospitals to increase access to health care.

Keywords: Malaria treatment, private hospital, public hospital, treatment cost
JEL Classification: I11, I15, I18

1.0 Introduction

Malaria is at the heart of Nigeria's morbidity burden. In effect, Nigeria bears about 25% of the disease burden in Africa (Etusim et al, 2013). Despite its curable nature, malaria accounts for up to 11% of maternal mortality, 25% of infant mortality and 30% of deaths in children under the age of 5 (WHO, 2012). Statistics shows malaria is by far the leading cause of patients' visit to the hospitals and deaths in the country[1] (see tables 2 and 3). Despite the worrisome challenge posed by the disease, malaria patients are faced with considerable financial costs in treatment when infected. The costs are incurred on diagnostics and on treatment. Given that more patients visit hospitals for malaria treatment than other diseases, patients are often subjected to queuing to see the doctor for treatment. The waiting time per each patient depends on the service rate, number of doctors available to attend to the patients and the actual number patients waiting for medical attention. Based on experience from some of such visits, a patient spends an a minimum of 15 minutes in the private hospitals and double this time in the case of visit to public hospitals. On seeing the doctor, and depending on the situation of the patient, the doctor may proceed immediately to treatment or refer the patient for diagnostic tests. Mostly, patients referred for diagnostic tests are those perceived to have acute malaria case or contrasting symptoms which may suggest other disease presence. The request for medical diagnosis forms a vital component in the treatments. Most visits to the public hospital required the tests than in the private hospitals. Studies on malaria had focused mainly on children (Okafor and Oguonu, 2006; Phillps, 2011; Ngomane and De jager, 2012), and emphasized on epidemiology (Snow et al, 1999; Okafor and Oguonu, 2006) and demographic transition (Fasoranti and Ofonyelu, 2013). The literature that discussed tretment costs focused on the aggregate (e.g. **Sicuri et al, 2013)** rather than on the micro cost of malaria treatment for individual patients. The country specific studies which attempted costing treatment only focused on the economic burden and the extent of variation of these burdens in sub-Saharan African countries**.** This study approached the costing from the demand side as patients are more in position to give accurate cost implication of their treatment than the doctors. Using a linear cost model, attempt was made to examine the extent of disparity in the treatment cost from the private and public hospitals. The rest of this study is sectioned as follows. Section 2 contains a brief on the distribution of medical and health care establishments in the state. Section 3 contains the methodology, while the results and findings and conclusion are contained in sections 4 and 5.

2.1 A brief on the distribution of medical and health care establishments in the state

In the distribution of medical and health care establishments in Ondo state, all local government areas (LGAs) has at least one of state specialist or a general hospital. On the whole, Akoko North West LGA has 2 general hospitals. Economic environment

[1] In the profile of the morbidity statistics of 255747 patients' visit to three State Specialist Hospitals (SSHs) in Ondo State between 2008 and 2013 across, malaria was observed to constitute 90.4%, 89.8%, 85.2%, 75.7%, 76.6% and 72.3% respectively over the period.

and demand for health care are key factors that have influenced the localization of the private hospitals. Akure, Ondo town, Ikare, Owo and Okitipupa are towns with the leading number of private hospital and maternity centres. As at 2008, Ondo state had 15 general hospitals cutting across the local governments, 4 state specialist hospitals and 142 private hospitals. The distribution of public hospitals has remained relatively same for the past five years except for the additions in the number of primary health centers and private hospitals across the state.

Table 1: The distribution of private and public hospitals in Ondo state

S/N	Local Govt. Area	HOSPITAL					HEALTH CENTRE		CLINICS	MATERNITY
		Federal Medical	State Specialist	General	Mission	Private	Community H/care	Basic H/care	Private	Private
1	Akoko N/East	-	1	-	-	6	1	12	4	2
2	Akoko N/West	-	-	2	-	1	2	19	4	1
3	Akoko S/East	-	-	1	-	-	3	7	5	-
4	Akoko S/West	-	-	1	-	1	2	20	17	-
5	Akure North	-	-	1	-	3	1	18	6	1
6	Akure South	-	1	-	-	69	1	16	16	12
7	Ese-Odo	-	-	1	-	1	3	31	-	-
8	Ilaje	-	-	1	-	3	3	20	1	-
9	Idanre	-	-	1	-	4	1	31	7	-
10	Ifedore	-	-	1	-	5	2	19	1	-
11	Ile-Oluji/Oke-Igbo	-	-	1	1	7	2	32	1	2
12	Irele	-	-	1	-	1	1	16	3	-
13	Odigbo	-	-	1	-	4	2	32	18	-
14	Okitipupa	-	1	-	-	6	3	21	-	3
15	Ondo East	-	-	1	-	-	4	9	1	-
16	Ondo West	-	1	-	1	23	3	20	5	3
17	Ose	-	-	1	-	2	4	9	1	3
18	Owo	1	-	1	1	7	3	14	10	3
	TOTAL	**1**	**4**	**15**	**3**	**145**	**41**	**346**	**100**	**30**

Source: Ondo State Ministry of Health (2008)

2.2 Some facts on malaria infection and treatment

Malaria is transmitted to human beings through the bites of infected female adult Anopheles mosquitoes. Once the parasite gets into the body, it attacks and destroys the red blood cell and other vital body organs, such as the brain, liver, etc. In its very advanced state, the production of red blood cells in the bone marrow is reduced; precipitating a weakening of the immune system (Cheesebrough, 1998). The commonest symptom from an infected person is fever, which may be acute,

intermittent or continuous. The fever comes with some or all of the following symptoms: headache, high body temperature, body pain, insomnia, cough/runny nose, sore throat/loss of appetite, general weakness, and coloured urine among others. In terms of morbidity, five key diseases have been more occurring (see table 2 and 3).

Table 2: Nigeria's total deaths by cause: percentage top 50 causes

Disease Type	*Number of Deaths	Percentage (%)	Disease Type	*Number of Deaths	Percentage (%)
Malaria	219,833	12.88	Cervical Cancer	9,659	0.57
HIV/AIDS	213,667	12.52	Liver Cancer	8,901	0.52
Influenza & Pneumonia	213,099	12.49	Tetanus	8,796	0.52
Diarrhoeal diseases	173,878	10.19	Epilepsy	8,520	0.5
Tuberculosis	97,669	5.72	Schistosomiasis	8,476	0.5
Stroke	87,717	5.14	Drownings	7,422	0.43
Coronary Heart Disease	71,732	4.2	Poisonings	7,297	0.43
Birth Trauma	68,213	4	Fires	6,497	0.38
Low Birth Weight	67,212	3.94	Suicide	5,910	0.35
Maternal Conditions	50,867	2.98	Prostate Cancer	5,884	0.34
Diabetes Mellitus	34,528	2.02	Liver Disease	5,442	0.32
Meningitis	33,935	1.99	Lymphomas	5,256	0.31
Pertussis	32,386	1.9	Peptic Ulcer Disease	5,091	0.3
Lung Disease	25,241	1.48	Syphilis	4,484	0.26
Road Traffic Accidents	24,850	1.46	Alzheimers/Dementia	4,224	0.25
Congenital Anomalies	19,116	1.12	Colon-Rectum Cancers	4,054	0.24
Violence	18,422	1.08	Other Neoplasms	3,378	0.2
Kidney Disease	16,892	0.99	Falls	3,373	0.2
Hypertension	14,829	0.87	Skin Disease	2,938	0.17
Other Injuries	14,392	0.84	Leukemia	2,700	0.16
Endocrine Disorders	12,715	0.75	Hepatitis B	2,403	0.14
Malnutrition	12,146	0.71	Oral Cancer	2,374	0.14
Asthma	10,871	0.64	Rheumatic Heart Disease	1,960	0.11
Breast Cancer	10,469	0.61	Drug Use	1,958	0.11
Inflammatory/ Heart	10,154	0.6	Upper Respiratory	1,917	0.11

*measured per 100,000 population

Source: WHO, 2011.

The diseases include malaria (12.88%), HIV/AIDS (12.52%), influenza and pneumonia (12.49%), Diarrhoea (10.19%) and tuberculosis (5.72%). Malaria, in particular posses a major health and developmental problem in Nigeria (Dutta, et al, 2009), as it recorded the lead cause of most patient's visit to the hospital. It is by far the most causative of the morbidity and mortality incidence in infants and young children (Fasoranti and Ofonyelu, 2013).

Table 3: Yearly Total Patient Morbidity Returns (2008-2013)

Age Group (Years)/ Disease (Sex)	< 1		1 -5		6 – 14		15 -18		19 - 44		45 – 64		65 and Above		Total		Aggregate
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	2008 Total
*Malaria Fever	2454	2185	3372	2979	780	796	178	309	466	1589	221	678	164	189	7635	8725	16360
Typhoid Fever	1	0	3	1	6	5	0	0	7	10	2	0	2	1	21	17	38
Cholera	10	3	0	0	0	0	0	0	0	1	0	1	0	1	10	6	16
HIV/AIDS	1	3	1	1	0	0	0	0	13	19	3	3	0	0	18	26	44
Diarrhoea	75	38	45	40	5	7	0	0	4	8	0	6	2	2	131	101	232
Pneumonia	25	20	30	18	5	4	5	1	12	9	8	8	19	6	104	66	170
Tuberculosis	0	0	0	0	1	2	0	2	19	13	3	4	5	3	28	24	52
Hypertension	0	0	0	0	0	0	0	0	25	135	122	556	137	210	284	901	1185
Total	2566	2249	3451	3039	797	814	183	312	546	1784	359	1256	329	412	8231	9866	18097
% per Group	14.18	12.43	19.07	16.79	4.40	4.50	1.01	1.72	3.02	9.86	1.98	6.94	1.82	2.28	45.48	54.52	100.00
2009																	
Age Group (Years)/ Disease (Sex)	< 1		1 -5		6 – 14		15 -18		19 - 44		45 – 64		65 and Above		Total		Aggregate
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Both
Malaria Fever	2643	2527	4774	3766	757	795	132	265	450	1529	259	692	177	207	9192	9781	18973
Typhoid Fever	19	23	62	44	31	37	18	6	7	30	14	57	37	55	188	252	440
Cholera	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1
HIV/AIDS	0	1	0	0	1	1	0	3	4	6	6	4	1	0	12	15	27
Diarrhoea	45	28	37	32	2	0	0	0	1	6	1	0	1	2	87	68	155
Pneumonia	31	15	14	18	2	2	3	4	16	3	4	5	3	6	73	53	126
Tuberculosis	0	0	0	0	0	0	0	1	4	2	3	3	4	2	11	8	19
Hypertension	0	0	0	0	0	0	3	2	26	181	115	655	247	160	391	998	1389
Total	2738	2594	4887	3860	793	835	157	281	508	1757	402	1416	470	432	9955	11175	21130
% per category	12.96	12.28	23.13	18.27	3.75	3.95	0.74	1.33	2.40	8.32	1.90	6.70	2.22	2.04	47.11	52.89	100.00
2010																	
Age Group (Years)/ Disease (Sex)	< 1		1 -5		6 – 14		15 -18		19 - 44		45 – 64		65 and Above		Total		Aggregate
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Both
Malaria Fever	1700	1606	2935	2439	530	502	120	169	440	1217	146	522	159	190	6030	6645	12675
Typhoid Fever	1	0	2	44	60	56	12	11	18	18	10	9	5	7	108	145	253
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HIIV/AIDS	0	1	0	0	0	0	0	0	2	8	1	1	0	0	3	10	13
Diarrhea	8	8	3	6	0	0	0	0	1	8	1	0	2	0	15	22	37
Pneumonia	13	10	13	6	8	2	2	2	4	9	3	7	6	9	49	45	94
Tuberculosis	0	0	1	1	0	0	1	0	4	4	4	5	2	6	12	16	28
Hypertension	0	0	0	0	0	0	1	0	39	203	145	675	290	427	475	1305	1780
Total	1722	1625	2954	2496	598	560	136	182	508	1467	310	1219	464	639	6692	8188	14880
% per Group	11.57	10.92	19.85	16.77	4.02	3.76	0.91	1.22	3.41	9.86	2.08	8.19	3.12	4.29	44.97	55.03	100.00
2011																	
Age Group (Years)/ Disease (Sex)	< 1		1 -5		6 – 14		15 -18		19 - 44		45 – 64		65 and Above		Total		Aggregate
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Both

Malaria Fever	1931	1511	2659	2490	451	418	90	132	464	1112	158	561	117	353	5870	6577	12447
Typhoid Fever	40	37	53	42	92	79	27	24	40	57	17	25	14	22	283	286	569
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HIIV/AIDS	21	0	1	0	0	1	0	0	1	6	0	2	1	0	24	9	33
Diarrhea	8	5	14	10	1	0	0	0	0	2	1	3	0	0	24	20	44
Pneumonia	25	9	8	5	7	7	0	1	5	7	9	6	10	5	64	40	104
Tuberculosis	0	0	0	0	0	1	0	1	37	137	236	816	395	553	668	1508	2176
Hypertension	0	0	0	0	0	0	0	1	17	69	121	325	195	342	333	737	1070
Total	2025	1562	2735	2547	551	506	117	159	564	1390	542	1738	732	1275	7266	9177	16443
% per Group	12.32	9.50	16.63	15.49	3.35	3.08	0.71	0.97	3.43	8.45	3.30	10.57	4.45	7.75	44.19	55.81	100.00

2012

Age Group (Years)/ Disease (Sex)	< 1		1 -5		6 – 14		15 -18		19 - 44		45 – 64		65 and Above		Total		Aggregate
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Both
Malaria Fever	2337	1980	2601	2386	546	510	109	144	491	1460	247	788	238	353	6569.0	7621	14190
Typhoid Fever	14	11	25	17	16	38	13	21	84	114	27	45	13	22	192	268	460
Cholera	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	2
HIIV/AIDS	0	0	0	0	0	0	0	0	1	14	2	3	1	0	4	17	21
Diarrhea	22	8	13	9	1	1	0	0	1	5	0	2	4	0	41	25	66
Pneumonia	15	13	7	7	5	1	1	1	14	4	2	6	5	5	49	37	86
Tuberculosis	0	0	0	0	1	0	0	1	16	4	2	1	4	553	23	559	582
Hypertension	0	0	0	0	0	0	0	8	54	265	294	976	464	1053	812	2302	3114
Total	2388	2012	2646	2419	569	550	123	176	661	1866	575	1821	729	1986	7691	10830	18521
% per Group	12.89	10.86	14.29	13.06	3.07	2.97	0.66	0.95	3.57	10.08	3.10	9.83	3.94	10.72	41.53	58.47	100

2013

Age Group (Years)/ Disease (Sex)	< 1		1 -5		6 – 14		15 -18		19 - 44		45 – 64		65 and Above		Total		Aggregate
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Both
Malaria Fever	2187	1987	2551	2346	536	511	102	124	451	1360	227	758	228	353	6282	7439	13721
Typhoid Fever	13	17	24	19	17	38	12	29	76	92	17	26	11	16	170	237	407
Cholera	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	3
HIIV/AIDS	0	0	0	0	0	0	0	0	1	11	2	3	1	0	4	14	18
Diarrhea	19	7	14	8	1	1	0	0	1	5	0	2	4	0	39	23	62
Pneumonia	17	11	6	8	4	1	1	1	15	4	2	6	4	5	49	36	85
Tuberculosis	0	0	0	0	1	0	0	1	16	4	2	1	4	553	21	559	580
Hypertension	0	0	0	0	0	0	0	8	59	242	263	965	464	1032	786	2247	3033
Total	2236	2022	2595	2381	559	551	115	164	619	1721	514	1761	716	1959	7354	10559	17913
% per Group	12.48	11.29	14.49	13.29	3.12	3.07	0.64	0.92	3.45	9.61	2.87	9.83	3.99	10.93	42.94	.47	100

*includes those who had malaria in pregnancy

Source: Hospital Health Records

The majority of the adult individuals are believed to carry the parasite without manifesting the symptoms (asymptomatic malaria). These groups of adults do not visit the hospitals except when the sickness becomes chronic. About 50% of the population has at least one episode of malaria each year. The economic impact of malaria has been estimated to cost Africa $12billion every year (WHO, 1998). The economic impact includes lose of health care, working days, cost due to sickness, day lost to education, decreased productivity due to brain damage from celebral malaria, loss of investment, tourism and diversion of household resources (Greenwood et al, 2005). Evidence indicates that malaria posses major economic burden for many African households, with expenditures made ranging between $0.23 and $15 on prevention methods, and between $1.79 and $25 on treatment. These results are however inadequate to permit a generalization for all countries because of the country specific nature of the disease. A strong link generally exists between malaria infection and infant and maternal mortality deaths. On the whole, greater majorities of the population live in malaria prone regions and faces risk of infection in addition to the recurring shift in weather which had favoured longer rainy season. Malaria accounts for 60% of outpatient visits and 30% of hospitalizations among children under five years of age in Nigeria (Nigeria Malaria Factsheet, 2011). The malaria health burden has an important morbidity as well as mortality component, with the severe forms of the disease (cerebral malaria and severe anaemia) the main reasons for hospital admissions of young children in malaria endemic areas (Goodmann, Coleman and Mills, 1999).

Poverty is a major factor in malaria prevention and treatment. Despite the National policy on the use of Artemisinin-based combination therapy (ACT) as the first-line treatment approach for malaria, the use of chloroquine and other dominated treatment drugs are still in large use by patients for the treatment of malaria principally because of its cheaper cost. Depending on the geographical region and the type of hospital involved, a malaria patient spends between N1500 and N3500 to treat the sickness in the non complicated case. In the complicated case, the cost could be as much as between N5000 to N15000. The state government greatly promotes treatment of the under 5 years old (between 1 and 60 months) and pregnant mothers as they are the most vulnerable to infection and death. In view of these, treatment costs for infants and pregnant women are paid for by the state government in all the public hospitals. For most treatments in children, injections are usually given as its effect is felt faster than drugs. The cost of malaria treatment depends on whether drugs are given alongside treatment or that patient have to go on their own to obtain the prescribed drugs as a different cost from the consultation and other medical costs charged by the hospital. For most private hospitals, prescription and treatment go together. But in the public hospitals, consultation are usually free and but patient may be required to pay for all the other medical costs in the course of treatment. In the typical situation, consultation of doctors are free once patent obtain the hospital card, but patients have to pay for the cost of every other services incurred in the course of treatment. A patient visiting private hospital pays for both consultation and every other treatment costs as a lump sum charge after treatment. In most private hospitals,

patients are treated based on the symptoms they profess to suffer. The doctors use their clinical experience to suggest the kind of sickness to treat based on the patient's complaint. Diagnostic tests are rarely carried out to confirm the intensity of sickness before treatment is administered. By this practice, the cost of diagnostics do not form part of the bill charged patients, and a result becomes a competitive strategy as it reduces the cost of treatment. In the case of the public hospitals, laboratory and diagnostic tests form integral part of treatment cost. A Patient waiting to see the doctor is examined on the necessary prescience[2] and diagnostic tests. The result of these test forms the basis of the prescription and treatment that will be administered by the doctor.

The cost of treatment refers to the charges paid to the hospital, including the cost of drugs prescribed where this is not already offered in the hospital. The separations between cost of drug procurement and treatment are more noticeable in public than the private hospitals. Most private hospital give an all inclusive bill; comprising for both the drug and treatment made but because consultation cost in the public hospital are mostly free, patients are usually made to pay for all the various medications administered. Private hospitals refer to the hospitals which are not owned by the government. Public hospital refers to government owned hospitals. Within the context of our study, the primary health centre, general hospitals, state specialist hospitals, federal medical centre and teaching hospitals are the public hospital referred to. The basic health centers are the most common as can been seen from table 1.

3.0 Data and Methods

3.1 Data

The data used for the study was obtained from the morbidity statistics of 85249 malaria patients' visit to Ikare State Specialist Hospital (ISSH) between 2008 and 2013, and 245 responses of patients who had been treated of malaria in public and private hospitals across Ondo State. The record keeping in the private hospitals were observed to be very poor as their data were kept along individual/family names. There was no such record as for all patients visiting hospital. Given the confidentiality ethics in health record keeping, accessing the general morbidity records of the private hospitals was very difficult. The data obtained gave good insight into how malaria bills were priced and generated for individual patients.

3.2 Model

A patient's medical bill depends on the intensity of sickness, cost of medical card, consultation fee, and cost of laboratory test (where necessary) and drugs prescribed. The intensity of sickness is defined with respect to the whether the malaria case is a complicated or a minor case. Generally, reference is made to the non complicated case except in a situation where it is otherwise stated. From the perspective of the

[2] This refers to the rudimentary test carried out on patients awaiting consultation of medical personal in the hospital. It include the test of the body temperature, weight, etc

patient, the value of time spent to see the doctor can also be factored in. Given these cost components, we state the cost functions for malaria treatment in private and public hospital as follow:

$$C_i(x) = \beta_1 + \beta_2 WT + \beta_3 LT + \beta_4 DG + \beta_5 CS + \beta_6 CF \quad (1)$$

$i = 1,2; x = 1, 2, \ldots, n$

where β_1 is the autonomous cost, which is may be assumed to be null for the sake of simplicity. WT, LT, DG, CS and CF refer to the waiting cost, laboratory test cost, cost of drugs prescribed, cost of consultation and card fee respectively. For a malaria patient, the choice to visit a private or public hospital depends on a number of factors. The intensity of the sickness, cost of treatment, proximity of the hospital to the residence, quality of treatment to be given and personal belief (in the capability of the health system). In each of these factors, the cost function of the hospital types has been dominant. Malaria treatment in Nigeria cost between N1500 and N3500 for the non complicated case, and may cost as much as N20000 to N25000 in the complicated case across the country. This depends on the type of hospital and the health policy of the individual States in the federation where the health care is sought. In Ondo State, an adult patient spends between N1000 to N2000 to treat malaria in public hospital, and between N2000 and N3500 for treatment sought from the private hospitals. These two cost range increase with the time spend in waiting to see the doctor. Waiting time in the private and public hospitals differ. On average, a patient spends a minimum of 15 minutes and 30 minutes in private and public hospitals respectively in order to see a doctor. Based on the minimum wage of N18000, and expected commitment of 170 hours offer-able by an employee in a month, the waiting time is equivalent to N26.5 and N53 for patients waiting at the private and public hospitals respectively. On average, the shadow cost of the waiting time will be approximately N40 per patient irrespective of the hospital type. For a patient requiring a laboratory test, the average cost of the test ranges between N350 and N500 in public hospitals and between N700 and 1000 in the private hospitals. In such test, two test choices are likely: using kits or blood fluid. While the use of kit is less expensive compared to the use of blood sample, using blood fluid give more accurate result. Based on experience and because of government national subsidy on malaria drugs, the cost of actual drug involvement in treatment of malaria ranges between N300 and 600 for the non complicated case, and may be as high as up to N5000 in the complicated case, whereby the patient need to be admitted into hospital. A major addition to the cost of drugs is the cost of injections which is added to costs of drug. Based on the foregoing explanations, equation (1) can be stated in more quantitative term as in equation (2) and (3).

$$C_v(x) = ₦26.5 + ₦500 + ₦600 + ₦500 + ₦100 \quad (2)$$

It is generally assumed that a medical card once obtained will last for 10 visits to the hospital. The effective charge on the card on every visit will therefore be ₦100 (₦1000/10). Equation (2) gives the effective cost of treatment for patients visiting the private hospitals, which can be approximated to give ₦1727. Based on equation (2),

we can derive the cost of medical treatment in public hospital. The can be given as (3):

$$C_p(1) = ₦53 + ₦500 + ₦600 + ₦50 \quad (3)$$

Equation 3 gives ₦1203 as the cost of treatment in public hospitals. In the complicated case requiring admission, patients spend between 2 and 5 days in the hospital bed. For this, the public hospital usually in-patients charged ₦500 per night. The average cost for in-patient in private hospitals per night is ₦1000. In all of these, the cost and intensity of treatment in either the private or the public hospital depends on the condition of the patient. The strong preference for self-medication by patients at the on-set of malaria sickness is fuelled by the fees charged in the hospitals and the long waiting time to see the doctor. The crux of this study is in measuring the size of disparity in the two hospitals billing costs. When the disparity is essentially large, the subsisting health care market is described as dualistic. Dualism, whenever it exists and in whatever ramification, points to economic underdevelopment. Dualism in health care supply can be said to exist when the private and public hospitals have little interdependence with each other. Based on the estimate made in equations (2) and (3), the gap between the two hospital prices is ₦524. We therefore can measure the can compute the coefficient of the dualism by taking the gap as the ration of the hospitals' prices. For the private and public hospitals, the dualism coefficient is 0.30 and 0.436. What this implies is that the cost structures of the two hospitals are 30% and 43.6% at independent of each other. This large size of institutional dichotomy is congruent with developing economy (Phillips, 1965). Using country specific data, Sicuri et al (2013) estimated household and health system costs per malaria episode to range from approximately from US$5 for non-complicated malaria in Tanzania to US$ 288 for cerebral malaria with neurological sequelae in Kenya. In Nigeria, this price is equivalent to N800 for the non-complicated case and approximately N46000 for the very chronic case[3]. The hospital cost per episode vary according to severity from US$ 2.89 to US$ 123 in Ghana, US$ 1.75 to US$ 48 in Tanzania and US$ 2.77 to US$ 57 in Kenya (**Sicuri et al, 2013)**. An outpatient visit costs in the region of $0.96 in Malawi; inpatient treatment for severe malaria costs $35 per admission in a typical Kenyan district hospital and absorbed 9% of hospital inpatient recurrent costs (Goodmann, Coleman and Mills, 1999). Higher personnel cost in the country made Ghana health system to be higher than in Tanzania and Kenya. Costs of severe cases are in most case over and above tenfold the cost of uncomplicated case in both the private and public hospitals in most countries. Equations (4) and (5) show the cost implications for patients with acute malaria cases involving admission into the hospital.

$$C_v(x) = ₦5000 + ₦500 + ₦1800 + ₦1500 + ₦100 \quad (4)$$

$$C_p(1) = ₦2500 + ₦500 + ₦1800 + ₦50 \quad (5)$$

[3] At $1 = ₦160 exchange rate.

In equation (4), a patient is charged ₦500 as the bed space charge in the case of the public hospitals and ₦1000 if it were in the private hospital. These costs replace the waiting cost if the patient were to be treated as an out-patient. In the costing, we assume that an infected with acute malaria case will spend 5 days for treatment. For such patient, we assume the laboratory test cost remains the same except where it is observed that there is no improvement with the treatment administered and other test will need to be carried out. This possibility we have been assumed away, as all patients are expected to respond positively to treatment either as an in or out-patient. For the cost of drugs, we assume the cost of drugs and consultation remained fixed at N600 and N500 for the first day and half the cost for the other days while the patient is hospitalized. The fixity is also assumed for the cost of treatment card. Given the foregoing analogy, equations (4) and (5) give N8900 and N4850 as the equivalent of equations (4) and (5). Since the private health care centers are the closest channel to the members of the public seeking health care, the high cost margin in the treatment costs contributes to the reason why many Nigerians do not have the penchant to see clinical assistance at the onset of malaria sickness. Nigeria is estimated to loses about N132 billion to malaria in man hours, while the illness drops the potential annual Gross Domestic Product by one percent[4]

Mortality rate from malaria is higher in children between the ages of 6 months and 5 years, while children below 6 months tends to enjoy a passive immunity acquired from the mother, coupled with the fact that the fetal hemoglobin still in the baby after birth does not support the parasite growth. Malaria immunity is usually developed in the children after about five years as a result of repeated attacks of malaria. Despite significant progress in increasing awareness, malaria remains one of the greatest public health burdens in Nigeria.

4.0 Further Findings

The central message from this study is that the private hospital bills mirrors that of the public hospitals. Except for the consultation fee, the charges in the private and public hospitals tend to approximate. Based on table 4, hospital bills in Ondo State tends toward a uniform price in the billing by the private and public hospitals. The approximation of costs in the hospitals suggests that the health care market is not essentially segmented.

Table 4: Cost of malaria treatment in some selected towns of Ondo State

Location/ Age categories	Private Hospital		Public Hospital	
	Children (₦)	Adults (₦)	Children (₦)	Adults (₦)
Ikare	800	2500	500	2300
Owo	1500	1300	350	1500
Akure	1500	3000	500	2000
Okititpupa	1200	2200	500	2500
Ondo	900	2200	500	2300

Author's survey

[4] This is equivalent to $5.1billion.

Note: costs excludes the cost of obtaining card/registration on the first visit to hospital

5.0 Conclusion

In the study, the components comprising treatment cost of malaria in private and public hospitals in Ondo state of Nigeria were investigated using a linear cost model. The study provides important insight into the monetary cost of malaria treatment in Ondo State that may assist policy makers in designing effective malaria management interventions. The indirect costs of the time taken by patients to seek care, and the lost productivity due to morbidity were calculated based on the prevailing minimum wage in the country. The disparity in the costs of treatment in the two hospital types reflects the extent to which the hospitals are independent. The study suggest proper record keeping by the private hospitals to aid research and reporting of developments in the health care outcome of the patients. Despite the disparity in the pricing of treatment by private and the public hospitals, findings suggest a dualistic but non segmented market as the cost components are not all totally different. This study suggests narrowing the gap between the costs of treatment in private and public hospitals to reduce the disease health burden

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