

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**



**ASSESSMENT OF COST OF MALARIA MANAGEMENT IN PRIVATE HEALTH
FACILITIES OF NATIONWIDE MEDICAL INSURANCE LTD IN GHANA**

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**A DISSERTATION SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH,
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FOR THE AWARD OF MASTERS OF PUBLIC HEALTH (MPH) DEGREE**

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DECLARATION

I hereby declare that this dissertation is my own work. It has not been submitted for any degree and is not being submitted as part of candidature for any other degree. I also certify that this submission has been written by me and any help received in writing this have been duly acknowledged under the supervision of Professor. Moses Aikins of the Department of Health Policy Planning and Management of the School of Public Health, University of Ghana.

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DATE

DEDICATION

This work is dedicated to God Almighty and my beloved wife and constant companion and our children Nyameye, Aseda and Adepa for their encouragement and support throughout the study.

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I am grateful to The Lord God Almighty, for His sovereign grace and protection throughout this MPH programme.

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ABSTRACT

Background: Every day, 720 children die of malaria which can be prevented or cured if presented early. The private health sector is a major institution in the response to treating malaria globally and nationally. In 2017, about 30% of health facilities were privately owned and contributed significantly to the management of malaria in Ghana. Given the importance of the private health sector to the malaria management, it is prudent to assess the cost of managing malaria in private health facilities

Methods: A descriptive cross-sectional census for the 2018 fiscal year of the cost of managing malaria cases in private health facilities of Nationwide Medical Insurance in Ghana was employed in the study. The cost of illness approach was used to estimate the direct medical cost of managing malaria in private healthcare facilities of Nationwide Medical Insurance. Medical claims were retrieved from the NMI database. This was achieved through the extraction of medical claims using the SQL server to run a query for the entire 2018 fiscal year. The extracted SQL data was transferred into the 2013 excel spreadsheet. Descriptive analysis was used to estimate the median, mean and standard deviation of the cost of managing malaria in private health facilities of NMI. STATA was used for these analyses.

Results: The average cost of managing malaria was estimated at GHS105.05 with a median of GHS 106.00. Administrative cost constituted about 52% of the cost profile with the investigation and medication cost taking 25% and 23% respectively. This is relatively high compared to other studies.

Conclusion: The cost of managing malaria in private healthcare facilities of Nationwide Medical Insurance is high. The administrative cost was identified to be the main cost driver of malaria management in private health facilities constituting more than half of the total cost of malaria management.

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LIST OF ABBREVIATIONS

ACTs	Artemisinin-based Combination Therapy
A-L	Artemether Lumefantrine
AS-AQ	Artesunate Amodiaquine
BF	Blood Film for malaria parasite
BUE	Blood Urea Electrolyte
CDC	Centre for Disease Control
CHAG	Christian Health Association of Ghana
COI	Cost of Illness
CR	Creatinine
DHAP	Dihydroartemisinin Piperaquine
FBC	Full Blood Count
FBS	Fasting Blood Sugar
G – DRG	Ghana Diagnosis Related Groupings
GHS	Ghana Cedi
GHS	Ghana Health Service
ID	Identity
IM	Intramuscular
IMF	International Monetary Fund
IPD	Inpatient Department
IT	Information Technology
IV	Intravenous
MOH	Ministry of Health
NHIA	National Health Insurance Authority
NHIL	National Health Insurance Levy
NHIS	National Health Insurance Scheme

NMCP	National Malaria Control Program
NMI	Nationwide Medical Insurance Ltd
OOP	Out of Pocket
OPD	Out Patient Department
RDT	Rapid Diagnostic Test
SQL	Structured Query Language
SSA	Sub Saharan Africa
SSNIT	Social Security and National Insurance Trust
STG	Standard Treatment Guidelines
USD	United State Dollar
WHO	World Health Organisation

DEFINITION OF TERMS

Administrative cost: This refers to all medical health services such as registration and consultation rendered during medical care.

Investigation cost: This refers to all diagnosis done leading to a diagnosis

Medication cost: This refers to all medication given

One – Stop – Shop: A health facility that has all services within

Total cost: This refers to only direct medical cost

CHAPTER ONE

INTRODUCTION

1.1 Background

Malaria is the most common disease in out - patient department cases and poses a serious economic burden as well as health implications for both patients and the world at large. It is a serious life scaring disease that is spread among people through the bites of the female *Anopheles* mosquitoes. It is an avoidable and medically treatable disease caused by parasites. The year 2016 revealed an estimated 216 million malaria cases in 91 countries. This indicated an increase of about 5 million cases compared to that of the year 2015 (WHO, 2017). In the year 2017, about 219 million cases of malaria representing an approximately 1% increase in the cases compared to the previous year were recorded. (WHO, 2018). On the other hand malaria deaths have been decreasing steadily with 446,000, 445,000 and 435,000 deaths in 2015, 2016, and 2017 respectively (WHO, 2017and 2018)

The tropical region of the world carries the highest burden of malaria disease (Ankomah, Asante & Asenso-okyere, 2003). The World Health Organisation African Region carries an extremely high share of the global burden of malaria. About 70% of the global burden of malaria in the year 2017 was dense in eleven countries, except India; all the other countries were found in Sub Saharan Africa (SSA). The Sub Saharan African region was host to about 151 million cases of malaria and also accounted for 275,000 deaths of the global burden in 2017 making it a major concern to public health (WHO, 2018). In Sub – Saharan Africa, malaria is a major threat to public health. It is the main cause of preventable morbidity and death among children under five years of age (Liu, Isiguzo, & Sieverding, 2015). Children under five years of age are most prone to suffer from the disease. About 219 million cases of malaria globally led to about 660,000

deaths in the year 2010; more than 80% of these were children under the ages of five years (Atta & Reeder, 2014). Malaria is considered to be a disease of the destitute. The prevalence is very high among the poor residing in rural settings and children under five years are most at risk (Atta & Reeder, 2014).

Malaria continues to form a greater proportion of healthcare budgets as the number of people with the disease increase worldwide. Globally, malaria control accounted for at least USD 2.9 billion in health expenditure in the year 2015, having increased by USD 0.06 billion since 2010 (WHO, 2016), however, this expenditure decreased by USD 200 million in 2016 (WHO, 2017). Though the global financing for malaria in 2017 realized an increase of USD 0.4 billion, it had a shortfall of about US\$ 1.3 billion of the estimated US\$ 4.4 billion (WHO, 2018). The total estimated investment in malaria control in Africa was US\$ 1.8 billion in 1995 and increased to US\$ 12 billion in 2000 (WHO, 2003). Although funding for malaria since 2010 has been stable, the amount of investment in 2016 was far from what was necessary to achieve the first milestone of the global technical strategy which was a reduction of about US\$ 3.8 billion (WHO, 2017). Since 2003, the total estimated investment in malaria control to Africa has reduced steadily, to US\$1.9 billion in 2015 (WHO, 2016).

In Ghana, malaria poses a major threat to businesses, about 0.5% of their gross returns are spent on the treatment of malaria in their employees and dependents (Nonvignon et al., 2016). A malaria patient is unable to work as efficiently as he or she could before the onset of the malaria disease. The total cost due to lost productivity, inefficiency and absenteeism attributable to malaria is enormous. Between 2012 and 2014, the total cost of malaria to businesses was US\$ 288,033.61, 93% and 7% of this cost represented direct and indirect cost respectively in Ghana (Nonvignon et al., 2016).

Assessing the health costs of managing malaria equips us with the requisite information for appealing for the necessary financing for the control of the disease from the governmental and non-governmental institution. This will reduce the burden of out-of-pocket payments among patients seeking healthcare. Health service providers are key to the provision of malaria management and hence essential to the success of its treatment. The quality and cost of services in these health facilities have serious implications on healthcare utilization as sub-standard services and high cost of healthcare can prevent utilization, be it state-financed or out-of-pocket. This will afford the use of ineffective care and practices (Liu et al., 2015). For every malaria case, the success of the treatment is highly dependent on the interaction of the health service and their cost with the patient and the household (Russel, 2004). The major barrier to access effective and efficient treatment for malaria has been identified as the high cost of services. This deters patients hence seeking care from less effective and efficient sources (Chuma, Okungu, & Molyneux, 2010; Amuri et al., 2014; Wiseman, Kim, Mutabingwa, & Whitty, 2006). According to Goodman et al (1999), this poses an issue of equity because the destitute who usually most affected are unable to utilize effective malaria management mainly because of high out-of-pocket payment in facilities in Ghana (Akazili et al., 2017).

With the high burden of communicable diseases mainly in Sub Saharan Africa coupled with limited resources and weak health systems, relevant and accurate cost data on the overall cost of managing malaria is crucial to improve approaches for the control and prevention of malaria. Other studies have particularly reported on the economic burden of malaria to households in Sub Saharan Africa (Asenso-Okyere & Dzator, 1997; Chima, Goodman, & Mills, 2003; White, Conteh, Cibulskis, & Ghani, 2011; Sicuri, Vieta, Lindner, Constenla, & Sauboin, 2013).

There have been several studies on the cost of treating malaria in several communities in Ghana. No study was found in a search from literature for the cost of managing malaria in private facilities of a private health insurance company in Ghana. Ascertaining the cost of managing malaria in private health facilities will facilitate effective planning & budgeting, cost-saving and efficiency to eradicate the disease from the country. This study will assess the cost of malaria management in private facilities of Nationwide Medical Insurance Limited (NMI) in Ghana.

1.2 Problem Statement

The burden of malaria in Ghana has realized substantive declines. In 2016, 10.4 million cases of malaria were reported nationwide with a corresponding 1264 malaria deaths in the same year (NCMP, 2018). The country reported about 10.2 million malaria cases in 2017 which represented 34% of OPD cases and 27945 cases on daily bases.

According to WHO (2018), it cost USD 2.32 to fund an individual at risk of malaria in the high burden countries. In Ghana, several studies on the cost of treating malaria have been carried out in many communities. Sicuri et al, (2013) estimated the direct cost of treating uncomplicated malaria to be US\$ 4.4 and US\$ 24.51 for severe malaria. In the Upper West Region of Ghana, the average cost of managing malaria (direct cost) for children under five is US\$ 4.13, in public health centres and CHPS (Dalaba et al. 2018). According to NHIS (2015), for private primary care Hospitals (catering exclusive), the cost of managing uncomplicated malaria and severe malaria is GHS15.89 and GHS76.79 respectively for persons with NHIS cards. These costs exclude the cost of medication. Most of these treatments for malaria are sought outside the public sector in Africa (Littrell et al., 2011).

Cost data on managing malaria in private health facilities remains a grey area and woefully inadequate. This has contributed to the inefficiencies in decision making, planning of cost

containment, budgeting, and determining the main cost drivers of managing malaria. The study seeks to assess the cost of managing malaria in private health facilities of NMI in Ghana to bridge the gap in cost data of managing malaria. This will enhance efficient decision making, forecasting, budgeting and planning towards the management of malaria in Ghana.

1.3 Conceptual Framework

Figure 1 shows the conceptual framework of cost of malaria management which is made up of the administrative, investigation and medication cost. The study will focus on the direct medical cost of managing malaria. The administrative cost consist of registration, consultation, cost on admission or detention. It also includes consumables, doctors and nurses care in the case of inpatients.

The investigation consists of all diagnoses. This includes the cost of blood film for microscopy (BF), rapid diagnostic test (RDT), full blood count (FBC), fasting blood sugar (FBS), and sicking for uncomplicated malaria. In severe cases, blood urea electrolytes and creatinine and lumbar puncture are also considered.

The medication cost comprises of all medications that are administered for malaria treatment. These medications include anti-malaria medication and non-malaria. The medications come in the form of orals and injectable. The sum of the administrative, investigation and the medication cost provides the cost of managing malaria.

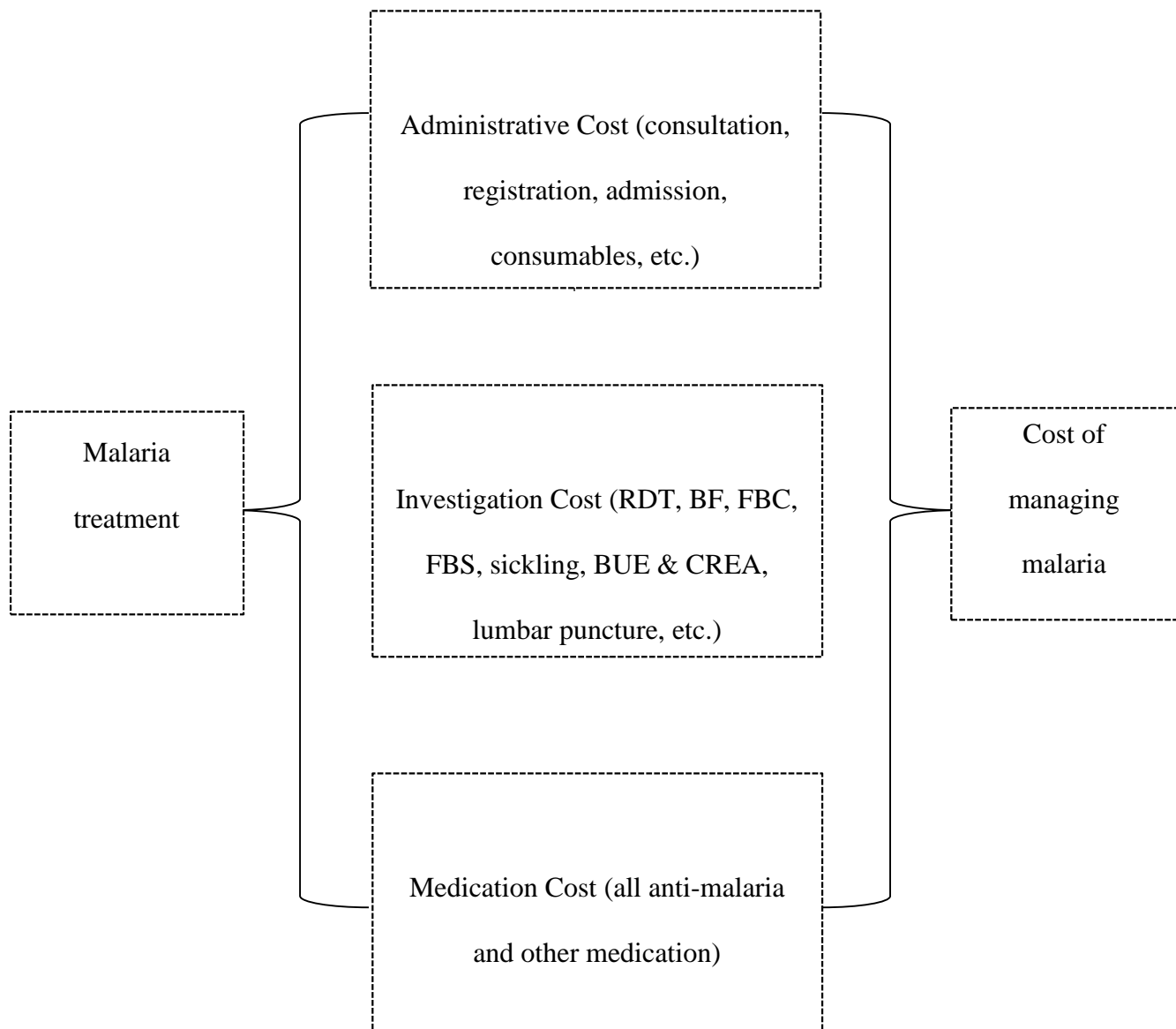


Figure 1: Conceptual Framework of cost of malaria management of NMI

1.4 Justification

People living with malaria together with their household commonly encounter fiscal, psychosocial and emotional crises once too often as a result of the disease. Knowledge of the healthcare cost (direct) borne by malaria patients in the management of the disease is a key ingredient to improving the quality of the management of the disease. This same information will

help health policy makers to map out better and more effective policies of regulating both public and private health facilities, and disease management campaigns.

If a study is not conducted in the stated area of Ghana, policymakers will remain oblivious to the facts on the ground (concerning total healthcare cost for malaria) and continue to manage the condition routinely which will yield satisfactory results. Stakeholders may not have the necessary cost data to assist them in decision making regarding the cost of managing malaria in private healthcare facilities.

Ghana is one of the ten SSA with a high burden of malaria (WHO, 2018), and insufficient reliable cost data analysis. Therefore, the objective of this study is to bridge this gap and provide adequate relevant cost data of managing malaria in private healthcare facilities of NMI which will be useful for decision making, planning of cost containment, analysing of the management of the malaria disease by clinicians and also identify the main cost components of managing malaria. The cost data will also be relevant for forecasting, budgeting and the allocation of health resources. This will be achieved through a comprehensive assessment of the cost of managing malaria at private healthcare facilities of NMI to generate relevant and reliable information.

1.5 General objective

The general objective of the study is to assess the cost of malaria management in private facilities of Nationwide Medical Insurance Ltd in Ghana.

1.5.1 Specific objectives

The specific objectives are:

1. To determine the administrative cost of malaria management in private facilities of Nationwide Medical Insurance Ltd in Ghana.

2. To determine the investigation cost of malaria management in private facilities of Nationwide Medical Insurance Ltd in Ghana.
3. To determine the cost of the medications of malaria management in private facilities of Nationwide Medical Insurance Ltd in Ghana.
4. To determine the overall cost of malaria management in private facilities of Nationwide Medical Insurance Ltd in Ghana.

1.6 Research Questions

1. What is the administrative cost of malaria management in private facilities of Nationwide Insurance Ltd in Ghana?
2. What is the cost of investigation for malaria management in private facilities of Nationwide Insurance Ltd in Ghana?
3. What is the cost of medications for malaria management in private facilities of Nationwide Insurance Ltd in Ghana?
4. What is the overall cost of malaria management (i.e. administrative, investigation and medication cost) in private facilities of Nationwide Insurance Ltd in Ghana?

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of Malaria

Malaria is an avoidable and curable disease that spreads through the bite of a female anopheles mosquito. Hundreds of thousands of lives are lost each year as a result of the malaria disease and a greater proportion of these deaths occur in SSA where the disease is the number one cause of death for children under five years of age. According to Snow, (2014) malaria is a serious disease manifesting itself as a swarm of symptoms, degrees of severity and indirect morbid outcomes.

Malaria is borne by parasites belonging to the plasmodium genus. Four main species are responsible for almost all human infections. These include; plasmodium vivax, plasmodium malaria, plasmodium ovale, and the plasmodium falciparum. The plasmodium falciparum is the number one cause of malaria and responsible for most severe malaria cases and mortality in Africa (Greenwood et al 2005a). Malaria is not spread from person to person but rather through the bite of an infected female anopheles (Bronner, Divis, Färnert, & Singh, 2009). Drug-resistant parasite in Africa is the main cause of mortality especially in Eastern Africa though overall child mortality has declined (WHO, 2018).

Over four hundred different species of anopheles mosquitoes exist but about only thirty of these vectors are considered to be dangerous and pose a threat to public health. Plasmodium vivax has a wider geographical distribution than plasmodium falciparum because it can develop in the anopheles mosquitoes at lower temperature and has a higher survival rate at higher altitudes and in temperate zones. It also rests in the liver known as hypnozoites and when revived can cause

major clinical deterioration months after the initial episode (Greenwood et al., 2005a). In many parts of the world apart from Africa, plasmodium vivax infections are more common compared to plasmodium Falciparum and cause substantial morbidity (WHO, 2018).

2.2 Burden of Disease

The burden of malaria globally has fallen as evident by the 2015 estimates compared to the 2000 estimates (WHO, 2016). The burden of malaria remains unacceptably high. Every year, about 200 million new cases are reported globally (WHO, 2018). The year 2016 recorded an estimated 216 million cases of malaria in 91 countries. This showed an increase of about 5 million cases over 2015 (WHO, 2017). Malaria mortality reached 445,000 in 2016 as compared to a similar number of 446 000 in 2015. The year 2017 also recorded an increase of about 3 million cases over 2016 with a fall in the death toll by 10, 000. Though the number of deaths is falling, it is falling at a far slower rate over the past ten years (WHO, 2018).

The WHO African regions homes a disproportionate share of the global burden, about 70% of the global burden is intense in eleven countries. Ten of these countries are found in Sub Saharan Africa. These high burden nations are home to about 151 million and 275, 000 malaria cases and mortality respectively (WHO, 2018). An estimated 3.5 million and 403, 000 (93% of global death) cases and deaths respectively were reported in Africa in 2017 (WHO, 2018).

A greater proportion of all these deaths occur in children under five years of age (Phillips, 2001). Every day, 720 children die of this avoidable and curable disease (WHO, 2018) Children who can survive this menace, about 15% suffer from neurological problems such as partial blindness, delayed speech, general fatigue and malaise, and convulsions (Schönfeld et al., 2007).

In cases where these children are not given special attention, these defects affect their learning and development such as dyslexia.

Children under the age of five years are more prone to malaria infection (WHO, 2018) because their immune system is not fully developed. Breastfeeding serves as a form of immunity for children, but they become more vulnerable after three months. In hyper - endemic areas, this can last until the age of five years. The immunity can disappear in a matter of years if there is no reinfection (Eddleston et al, 2008). Additionally, under five years of age experience the major malaria burden since they are usually infected with other parasites and malnutrition. These add to a feebler immune system, which results in a higher risk for malaria. Malaria infection and malnutrition are reasons for a growing number of anaemia burden in children (Greenwood, Bojang, Whitty, & Targett, 2005b).

In Ghana, malaria continues to be the main cause of morbidity and mortality (NMCP, 2013) 10.4 million persons reported to the various health facilities with malaria representing about 39% of all OPD cases. This represents a 2.5% rise in the cases compared to the same period in 2015 (GHS, 2017). On the average 28,607, malaria cases were reported nationwide in all health facilities, 25% and 4% of all admissions and deaths respectively were attributed to malaria in 2016 (GHS, 2017). Out of the 1,264 malaria deaths in 2016, 590 were children under five years. Children under five are at higher risk of malaria (Phillips, 2001). In 2017, 10.2 million malaria cases were reported indicating about 2% decrease compared to 2016 (NMCP, 2018). Malaria represented about 34% of all OPD cases in Ghana and 19% and 2% of total admissions and total deaths respectively. 54% of children under five years of deaths are attributed to this curable disease (NMCP, 2018). Table 1 shows the burden of malaria in Ghana in the year 2017.

Table 1: Malaria Morbidity and Mortality

	Indicator	Number Reported	Percentage Of Cases Attributable To Malaria
Outpatient department (OPD)	OPD Cases	30,014,359	
	Malaria Cases	10,211,971	34
	Malaria Cases tested	8,911,490	87.3
	Confirmed Malaria Cases	4,893,959	47.9
	Suspected Malaria in Pregnancy cases	399,736	3.9
	Tested Malaria in Pregnancy cases	385,158	96.4
	Confirmed Malaria in Pregnant cases	133,687	33.4
Admission	Total Admissions (All ages)	1,523,764	
	Malaria admissions (All ages)	289,627	19
	Under 5 malaria admissions	161,157	55.6
Deaths	Total deaths (All ages)	29,517	
	Total malaria deaths (All ages)	599	2
	Under 5 years of age malaria deaths	327	54.6

Source: (NMCP, 2018)

2.3 Private Sector Healthcare

Data available from about 18 Sub – Saharan Africa indicates that about 88% of children treated for malaria was carried out in the public health sector compared with a 74% in other formal private health facilities (WHO, 2018). The private health sector management of malaria in the sub Saharan African region is increasing gradually, however the data from the private sector are rarely available to National Malaria Programs making it difficult to interpret trends of malaria morbidity and identify potential gaps in the private health sector (WHO, 2018).

The private health sector is usually the first point of care for primary healthcare services predominantly for children (Snow et al, 1992). In the case of malaria management, about three - quarters of all treatment for fevers happen in private health facilities (Waters et al, 2003). The significant role of the sector for healthcare services is likely to be associated with the perception of quality of service compared to the public sector (Brugha & Anthony, 1998). The high risk rural poor also often patronize the informal private providers in many cases (Bennett et al, 2014)

In Ghana, the private health sector is an essential partner in the delivery of healthcare. It complements the efforts of the public and other health facilities. Out of the over 3,000 health facilities in Ghana, about 30% are privately owned making the sector an integral part of the provision of healthcare (Koram, 2017). According to Molini et al (2014), the private health sector refers to all non – government health actors; faith or mission based facilities; for profit and non for profit institutions. These private health facilities provides about 44.6% of all services used by patients including malaria management. Most of the self – financing private health sector are concentrated in the urban and peri - urban areas with low rural penetration. This is as a result of the numerous challenges it faces due to the poverty levels in the rural areas.

Involving the private health sector in malaria management is essential for lowering the number of cases if not eliminating it, especially in settings where the private sector is a major source of healthcare. However, cost data from private health sector remains a grey area in Ghana.

2.4 Signs and Symptoms

The signs and symptoms of malaria are very similar to many other feverish illnesses (WHO, 2018). Patients with malaria often complain of headaches, or a history of fever within the past 2 – 3 days, shivering, chills and general body pains. Other clinical symptoms include loss of

appetite, sweating, general body pains, nausea, and vomiting. Jaundice, splenomegaly and joint pains are also common. Children often also complain of abdominal pain and in infants' refusal to feed (MOH, 2017 and 2014). Patients with severe malaria also experience convulsions, difficulty in breathing, dark coloured urine and oliguria (MOH, 2017). These signs and symptoms can occur at a time or a combination at a time.

2.5 Diagnosis

The unconditional necessity to enhance the effective management of the malaria disease in the face of raging drug resistance places a crucial necessity on the precision of malaria diagnosis (Wongsrichanalai, Barcus, Muth, Sutamihardja, & Wernsdorfer, 2007, WHO, 2000). Diagnostic accuracy has important malaria management implications (Wiseman et al., 2006) The Global Technical Strategy opines that for every suspected malaria case tested, every confirmed tested case be treated. It recommends a timely and precise treatment of the disease and its reporting (WHO, 2018).

Microscopy (BF for malaria parasite) or rapid diagnostic test (RDT) is recommended to ascertain the existence of the malaria parasite before commencing treatment (MOH, 2014). Blood film for microscopy is the preferred diagnostic tool which must be carried out in all healthcare facilities if it is available for every suspected malaria case. In the absence of BF for malaria parasites or where it is not feasible, RDT is considered as the best alternative. In cases where both are unavailable, management could be given on grounds of diagnosing presumptively.

Aside from the microscopy and RDT, the Ghana Standard Treatment Guidelines (MOH, 2017) recommend a full blood count test (FBC) and a sickling test for uncomplicated malaria. Random

blood sugar (RBS), blood urea electrolyte (BUE) & creatinine, blood grouping and cross-matching, and lumbar puncture tests should be considered in severe malaria cases.

2.6 Management of Malaria

The Ghana Standard Treatment Guidelines (MOH, 2017), outlines three objectives in managing uncomplicated malaria, these are:

- To prevent the escalation to complex malaria
- To reduce the period of the malaria disease
- To reduce the progress of the drug resistance of the malaria parasite

With cases of severe malaria, the Standard Treatment Guidelines outlines the following:

- To provide specific anti-malarial medication parentally to ensure sufficient blood-serum concentrations of the drug and rapid clearance of parasitemia
- To provide immediate treatment for life-scarring problems such as convulsions, hypoglycaemia, dehydration, renal diseases
- To provide proper care

Before 2004, Chloroquine and other monotherapies were the preferred line of treatment for uncomplicated malaria. The malaria parasite built a resistant to this monotherapy which necessitated a national policy on malaria case management (MOH, 2014). Artemisinin-based Combination Therapy (ACTs) was recommended for the management of uncomplicated malaria. It is the most effective and efficient anti-malaria medications available (Greenwood et al., 2005a). They are given in combination with a second, long-acting antimalarial to enhance management and avoid the development of drug resistance (CDC, 2013). According to the

malaria management policy (MOH, 2014), three ACTs of medications have been endorsed for use throughout the country. These are:

- Artesunate - Amodiaquine (AS-AQ)
- Artemether - Lumefantrine (A-L)
- Dihydroartemisinin - Piperaquine (DHAP)

The medications are very good for the management of malaria in both adults and children. However, artemether - lumefantrine is not recommended for children less than six months. It is recommended that quinine is used in the first trimester of pregnancy and AS-AQ and A-L combination can be used in the second and third trimester (MOH, 2014)

2.7 Malaria Medication for Severe Malaria

According to the malaria management policy MOH (2014), there should be no delay in the commencement of treatment after a clinical evaluation of a patient has confirmed the parasitology of the disease. In the administering of treatment, intravenous or intramuscular artesunate is preferred first, followed by intramuscular artemether and intravenous or intramuscular quinine in that order (MOH, 2017). Parenteral management must continue until the patient is good enough to take oral medication. This should be done at least 24 hours even is the patient is well to take medications orally before 24 hours. Management of the malaria disease must be completed with a full three-day course of any of the ACTs.

2.8 Cost of Managing Malaria Estimates

Malaria poses an economic burden on the patient and the entire household at large. In our quest to attain the WHO global technical strategy of reducing malaria incidence and death by 40% (WHO, 2018), it is necessary to consider the cost of malaria. According to Sachs & Malaney

(2002), wherever malaria thrives most, the development of the society is least. According to WHO (2018), it cost USD 2.32 to fund an individual at risk of malaria in the high burden countries.

In Nigeria, the average cost of managing an episode of malaria is USD 6.64 and USD 6.58 for adults and children respectively. Cost on medications, closely followed by those on laboratory investigations were the most contributors to the total cost of managing malaria (Onwujekwe et al., 2010). Jimoh et al (2007), also estimates the cost of managing malaria in Nigeria to be USD 5.70. Ezenduka, Falleiros, & Godman, (2017) did estimate USD 31.49 for the treatment of uncomplicated malaria without co-medication and USD 35.63 with co-medication in public health facilities in Nigeria, anti-malaria medications represented 6.6% of the total cost. Salawu et al (2016) estimated the cost of managing an episode of malaria in private health facilities in Nigeria to be USD 13.08. Ayieko et al (2009), established providers' cost of managing malaria in hospitals to range from US\$47 to US\$75 for children without considering whether it is simple malaria or severe malaria in Kenya. A diagnosis for malaria was estimated at USD 3.13 in Zambia (Poyer et al., 2015).

Similarly, in Mozambique, the cost of managing malaria is USD 2.76. USD 2.53 of the cost is incurred on anti-malaria medications and the rest for consultation and investigations (Castillo-Riquelme, McIntyre, & Barnes, 2008). Ethiopia, on the other hand, estimated the average cost of malaria to be USD 2.70 in private clinics and USD 1.44 at public facilities, 90% and 82% of the cost was attributed to anti-malaria medications in private clinics and public health facilities respectively (Deressa, Hailemariam, & Ali, 2007). Sicuri et al (2013), estimates the cost of managing simple and severe malaria in Tanzania and Kenya to be USD 3.56, USD 19.82 and

USD 8.68, USD 32.28 respectively. Managing cerebral malaria is also estimated to cost USD 19.82 and USD 32.28 in Tanzania and Kenya respectively.

In Ghana, several estimates of the cost of malaria have been carried out. According to Abotsi (2012), in the Upper East region of Ghana, the cost of malaria management ranges between USD 10.20 and USD 44.40 for uncomplicated malaria and severe malaria respectively. USD 20.70 of the cost of severe malaria is attributed to service cost in the health institution. Sicuri et al, (2013) also estimate the cost of uncomplicated malaria in Ghana as USD 5.70 and USD 48.73 for severe malaria, with cerebral malaria cases, the cost of managing the disease is USD 49.17. Tawiah et al. (2016) estimated mean direct cost per fever case to be US\$2.76. The cost of treating an under five years old with malaria is USD 4.13 in the Upper West Region of Ghana. Most of these treatments are sought in health canters and Community – Based Health Planning and Services (CHPS) (Dalaba et al., 2018). Akazili, Aikins, & Binka (2011), also estimates the direct medical cost of malaria to be USD 1.87 in northern Ghana. According to NHIS (2015), for private primary healthcare hospitals (catering exclusively), the cost of managing uncomplicated malaria and severe malaria is GHS 15.71, GHS 77.06 and GHS 16.07, GHS 76.52 for persons less than 12 years of age and persons equal to or greater than 12 years of age respectively. Cerebral malaria cost GHS 468 and GHS 373.72 for children and adults respectively. All these costs exclude the cost of medications. Cost for microscopy and RDT also cost GHS 4.48 and GHS 2.24 respectively. Ankomah., Asante., & Asenso-Okyere (2003), established a negative relationship between malaria disease and economic growth, according to them, for every 1% increase in malaria morbidity, there is a 0.41% fall in economic growth.

2.9 Healthcare Financing

According to WHO (2007), the right to health includes the availability of health facilities, accessibility in terms of non-discrimination and affordable, general acceptability and appropriate quality. Nonetheless, about 150 million people suffer financial constraints due to out-of-pocket (OOP) payments annually pushing about 100 million people globally below the poverty line (WHO, 2013).

The need for Health system strengthening was highly stressed in the Alma-Ata Declaration of "Health for All" through Primary Health Care (WHO, 1978, Cueto, 2004). Health financing is one element of the six building blocks of health systems. The others are; health information; access to medical products, vaccines, and technology; service delivery; health workforce and leadership and governance (WHO, 2007).

The equitable and quality distribution of healthcare in Ghana is highly influenced by finances. Although Ghana is committed to the Abuja declaration which entails signatory countries to apportion 15% of government spending to health, there has been an underfunding of the health sector by the central government with an average of about 12% (Ababio, Osei Kufuor, & Ankrah, 2017).

Healthcare financing in Ghana has gone through numerous changes as a result of the economic situation, political instability, and public spending priorities. Healthcare in the pre-independence era was solely by OOP financing. After independence, under the leadership of Dr Kwame Nkrumah in 1957, he adopted the socialist approach hence providing free healthcare services for all (MOH, 2015). Due to this, all charges were stopped in public health facilities making it possible for the most vulnerable to access formal healthcare. However, free healthcare was

challenged by the uneven geographical distribution of healthcare facilities and human resources (Alatinga & Williams, 2014). Quality of service was challenged due to this challenge. Notwithstanding this, free healthcare continued until the overthrow of Nkrumah.

The economic recession in the 1980s placed a huge burden on the country's health financing system (SAPRIN, 2004). To stabilize the economy, the then government adopted the Breton Woods twin (IMF – World Bank) program which led to the removal of all subsidies on healthcare and the enforcement of the fee for service at all public health facilities (Ministry of Health, 2015). As a result, several laws were introduced and enacted to ensure the recovery of recurrent costs. These laws included the Hospital Fees Decree, 1969 (NLCD 360) in 1969. The Hospital Fees Act, 1971 (Act 387) then followed. In 1985, the Hospital Fees Regulation 1985 (LI 1313)

The cash-and-carry system was introduced and instituted as a form of financing healthcare in 1992. This allowed the recuperating of cost and raising revenues for service providers (MOH, 2015). The economic conditions of the people in terms of income levels and poverty levels made it difficult for most people to access healthcare. Consequently, OPD attendance dropped by about 66% as the populace could not access medical care due to the cost involved (Hsiao, Shaw, Fraker, & Jowett, 2007). Mutual health schemes during these periods spread across the country as it did support the individuals cater to the cost of healthcare. The types of schemes ranged from district-wide schemes such as in Nkoranza and Dodowa and other communities based on religion, occupation, and others (Ababio et al., 2017)

Though the quality of service did improve, there were inequities in access due to the high cost of services. In 2003, the then President, J. A. Kuffour, fulfilled one of his campaign promises while in opposition by introducing and implementing the National Health Insurance Scheme

(NHIS). The NHIS Act, Act 650 (2003) as amended Act 852 (2012) was passed to facilitate the access to quality healthcare for all especially the destitute and the marginalized in society (NHIS 2018).

Per the NHIS amended Act 852 (2012), All citizen is required to sign up with the National health insurance scheme. The legal establishment is nonetheless not a success as a result of the rather greater proportion of the informal sector and inadequate ability of the NHIA administratively in Ghana. Funding of the National Health Insurance Scheme is done centrally through the National Health Insurance Levy (NHIL). The sources of the funding are a 2.5% levy on goods and services and the Social Security and National Insurance Trust. These are mainly formal workers. The scheme is also highly funded by some donors and also by the payment of premiums by subscribers. Premiums are only limited to the informal sector since the formal sector make their contribution through SSNIT. A majority (about 70%) of the funding of NHIS is from the National Insurance Levy. SSNIT contributes about 17.4% of the finding whilst premiums collected amounts to about 4.5% of the total funding. Donations, parliamentary allocation, accrued interest from investment and grants are other sources of funding to the NHIF. The failure of several mechanisms of financing healthcare including “cash and carry” led to the introduction of the National Health Insurance Scheme. This is to provide access to healthcare in our quest to achieve universal health coverage. (Agyepong & Adjei, 2008). The cumulative membership of the scheme as at 2010 was 18 million (NHIA, 2010).

2.10 Cost of Illness

The cost of illness (COI) studies estimates the overall economic burden of disease on humanity as a whole in terms of the utilization of healthcare resources and production loses (Tarricone, 2006). The economic cost of a disease is classified into the direct, indirect and intangible cost.

Direct cost refers to healthcare and non-healthcare cost. Healthcare cost is medical care expenditure for consultation, investigation, and treatment. The non-healthcare cost is the cost incurred on transportation, time loss by a family member for caring for the patient. Indirect cost refers to transportation cost, loss of productivity by employed patients due to absenteeism, and wage loss (opportunity cost) as a result of illness (Oderda, 2003). The intangible cost is the psychological and emotional pain as a result of the disease, these are seldom quantified in monetary terms hence not considered in COI analysis (Rice, 2000, Tarricone, 2006).

COI studies can be grouped based on the epidemiological data used, methods used in estimating the economic cost and the relationship between the initiation of the study and the data collection. The epidemiological data used refers to the prevalence and incidence of disease at a given period that is the number of cases at a location and the number of new cases being reported. The methods used in estimating the economic cost refers to whether the top-down or bottom-up approach is used in estimating the economic burden of. These are the micro and gross approaches. The initiation of the study and the data collection tries to know whether the study is a prospective or a retrospective study (Tarricone, 2006)

There are two main approaches used in COI studies, that is the micro-costing approach and the gross costing approach (Russell, 2005). The micro-costing approach is estimated by summing up each item cost element that has contributed to the delivery of a health service whereas the gross costing approach is assessed by dividing the total cost of service delivery with the total number of services rendered. The micro-costing approach is considered as the "gold standard" for cost assessment as to its more accurate (Tarricone, 2006)

Cost of illness studies provides effects of diseases in monetary terms, the generally accepted language of decision-makers and policymakers. These assessments are used to define the

intensity of the disease, to justify intervention programs, assist in the allocation of resources and provide the basis for policy and planning relative to prevention and control initiative (Rice, 2000).

The literature reviewed revealed the increasing trend in the burden of malaria especially in the WHO African region. Malaria affects children under five years of age most since they have lower immunity. It also affects mainly the poor in society and wherever it thrives there is not much development. The high prevalence of malaria OPD cases and the number of deaths it causes makes it a public health burden. The associated cost of managing malaria in Sub Saharan Africa is relatively high compared to the economic standards of the region.

Different methods have been used to cost malaria to assess the burden in different parts of the world especially in Sub Saharan Africa. Though several studies have been done in Ghana on the economic burden of malaria, little work has been done on the cost of malaria in private healthcare facilities. The cost of malaria management in private healthcare facilities remains a grey area in Ghana.

CHAPTER THREE

METHODS

3.1 Study Design

The study was a descriptive cross-sectional census for the entire 2018 fiscal year of the cost of managing malaria cases in private health facilities of Nationwide Medical Insurance Ltd in Ghana. It was a retrospective quantitative study of the average and median cost of managing malaria at the various private health facilities of NMI. This method was employed due to the nature of the medical claims from NMI. There are multiple diagnosis and this study only considered the single malaria cases. The study therefore considered all the medical claims that had only malaria as its diagnosis to allow it have all such claims covered. The cost of illness was employed to estimate the cost of managing malaria in private healthcare facilities of NMI.

3.2 Study Area

Secondary data that is malaria medical claims of private health facilities of NMI from all the ten regions of Ghana were collected for this study. Nationwide Medical Insurance, formerly known as Nationwide Mutual Healthcare was established by the Society of Private Medical Practitioners, Ghana in 1993 and managed by Vanguard Assurance Company. Nationwide Medical Insurance has over 500 health service providers on the scheme comprising of public health facilities, facilities from the Christian Health Association of Ghana (CHAG) and private healthcare facilities. The insurance receives about 20,000 medical claims monthly for processing and reimbursement. It is a private commercial Health Insurance Company registered under the laws of Ghana. It is certified by the NHIA to provide healthcare financing mechanisms to the corporate world, individuals and groups. It offers a broad range of superior and unrivalled quality

healthcare financing benefits by optimising the limited healthcare facilities in Ghana through effective and efficient risk management at all levels of cover for its clients.

It employs up to speed information technology which makes the company the industry leaders. Nationwide Medical Insurance covers both outpatient department (OPD) and inpatient department (IPD) cases which include medical consultation, investigations, medicines, admissions, emergencies, surgeries, dental services, radiological services, eye care, mental health, rehabilitation, and wellness benefits (annual medical screening for its clients).

3.3 Study Population

The study population was 480 malaria medical claims from 86 private health facilities of Nationwide Insurance Ltd in Ghana for the 2018 fiscal year. These were private healthcare facilities that presented claims with malaria as the only diagnosis.

3.4 Study Variables

The variables in this study did comprise of the dependent variable and independent variable. The dependent variable was the cost of malaria management. The independent variables were the administrative cost of malaria which include registration, consultation, wards and other consumables', the cost of investigation and the cost of medication as shown in Table 2

Table 2: Dependent and Independent Variables

Variable	Type of Variable
Dependent Variable	
Cost of malaria management	Continuous
Independent Variable	
Administrative cost	Continuous
Cost of investigation	Continuous
Cost of medication	Continuous

3.5 Sample Size

All medical claims of malaria patients from the private facilities of Nationwide Insurance Ltd in Ghana thus 480 were used.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

All medical claims of malaria patients from all "one-stop-shop" private health facilities in Nationwide Insurance Ltd in Ghana qualified to be included in the study "One-stop shop" private health facilities are facilities that have the consultation, laboratory, and pharmacy to provide all medical services needed for the management of malaria

3.6.2 Exclusion Criteria

All incomplete medical claim data from "one-stop-shop" private health facilities in Nationwide Insurance Ltd in Ghana were excluded

3.7 Sampling method

A census of all medical claims of malaria cases from 1st January 2018 to 31st December 2018 of "one-stop-shop" private healthcare facilities of NMI was used in this study.

3.8 Quality control

3.8.1 Data collection techniques/methods and tools

Data was collected from Nationwide Insurance Ltd in Ghana in March 2019. Data extraction form was used to extract data from existing medical claims. Two personnel's from the Information Technology department were involved in the data collection exercise to provide technical support to manage electronic data. Based on the system of Nationwide Medical Insurance, a query was run to extract medical claims of only malaria cases submitted from only private health facilities on the scheme for the year 2018. The Principal Investigator reviewed the data extraction forms for blanks. Incomplete data were excluded from the data and collated only complete data. Data extraction forms were serialized to prevent double entry.

3.8.2 Pre- Data collection

One personnel at the IT department of Nationwide Insurance Ltd in Ghana and a research assistant were trained on data sorting and filtration of medical claims to assist the Principal Investigator for this study. Unique ID numbers were assigned to each claim excluding their names using excel to correspond to a particular medical claim for auditing and data cleaning. All possible identifiers were removed

3.9 Data Processing

Medical claims were retrieved from the NMI database. This was achieved through the extraction of medical claims using the SQL server to run a query for the entire 2018 fiscal year. The

extracted SQL data was transferred into the 2013 excel spreadsheet. The data were filtered to have medical claims that had malaria only as a diagnosis from all private healthcare facilities of NMI. The data was sorted in terms of the type of facility and the regional bases of the medical claims. The data was further transposed using excel to have the variables of interest in the rows for analysis. The data was finally transferred into a STATA output using STATA 15.

3.10 Data Analysis

The data analysis covered the estimation of administrative cost, investigation cost medication cost of malaria and the overall cost of managing malaria

3.10.1 Estimation of Administrative Cost

The administrative cost was obtained by summing up all the administrative medical costs (registration, consultation, admission, consumables, and others). This will be divided by the total number of administrative services to obtain the mean administrative cost. The median, interquartile range and the standard deviation of the administrative cost were also estimated.

3.10.2 Estimation of Investigation Cost

The investigation cost of malaria did include the cost of BF, FBS, FBC, RDT, BUE & CR, sickling, lumbar puncture, etcetera. The investigation cost of malaria will be obtained by summing up all the investigation costs. This will be divided by the total number of investigation services to obtain the mean investigation cost of managing malaria. Standard deviation, median and interquartile range of investigation cost was also be estimated.

3.10.3 Estimation of medication cost

The medication cost (anti-malaria and other medications) was obtained by summing up each medication cost. This will be divided by the number of medical drugs to obtain the mean

medication cost. Standard deviation, median and interquartile range of the medication cost was also valued.

3.10.4 Estimation of Overall Cost of managing malaria

The overall cost of managing malaria in private facilities of NMI was achieved by summing the administrative, investigation and medication cost.

The cost of managing malaria was then classified by the type of facility (essential, executive, premier), age, and the regions. The mean \pm SD, median and interquartile range was estimated for the various classifications. Regional and type of facility comparisons will be done. STATA version 15 was used.

3.11 Sensitivity Analysis

In analysing the robustness of the results concerning the data, a one – way and a multiple-way sensitivity analysis were conducted. The consultation component of the administrative cost and the oral anti-malaria drug were used since these two components vary among facilities and volatile. These were used to assess the effect on the cost of managing malaria.

3.12 Ethical Issues

Ethical clearance was sought from the Ghana Health Service Ethics Review Committee before the start of this study. Also, approval was sought from the management of Nationwide Medical Insurance Ltd in Ghana for the use of their data.

3.12.1 Approval

An introductory letter was sought from the University of Ghana, School of Public Health to Nationwide Medical Insurance to seek approval for the use of medical claims of private facilities

of the scheme for the study. The Principal Investigator attached a purpose statement to the introductory letter to obtain the approval

3.12.2 Risk

The research did not pose any risk to Nationwide Medical Insurance Ltd in Ghana as well as its partners.

3.13 Benefits

The findings of the study provided relevant cost data on malaria management which could be used for planning, budgeting, and forecasting. The study also provided the main cost drivers of managing malaria in Ghana.

3.14 Privacy and Confidentiality

The data received from the medical claims during the study were protected with a two-way authentication that is, a notification was always sent to the Principal Investigator automatically anytime an individual involved with the work did seek access the data. Under no circumstance was information received shared with a third party. Also, hard copy data was kept in a cabinet under lock and key, accessible to Principal Investigator only.

Personal data of an individual in the extracted medical claims were excluded. Individual information like name, contact numbers, employers and companies were excluded and deleted from the data set to ensure that the identity of any person involved in the data was not revealed.

3.15 Data Storage and Management

Secondary data collected for the study was stored on an external hard disk drive. Hardcopies and softcopies were burnt and deleted from all devices respectively after the data was analysed and findings submitted.

3.16 Conflict of Interest

The Principal Investigator had no conflict of interest in the study.

3.17 Funding

The entire study was solely funded by the Principal Investigator.

3.18 Limitations

The limitations of the study were:

- Cost of managing malaria was only based on the direct medical cost forgoing other cost components
- The study considered only private health facilities in Ghana
- The study did not consider the severity of malaria since all diagnosis was just malaria.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the study results. The results of the study are categorized into sections including background characteristics of the medical claims, the administrative cost of managing malaria; the investigation cost of managing malaria; medication cost of managing malaria; total cost (direct medical cost) of managing malaria in private health facilities of Nationwide Medical Insurance. Comparisons based on age, regions, and facility types were also done.

4.1 Background characteristics of medical claims

A total of 480 malaria medical claims were processed as shown in Table 4.1. Majority of the medical claims were males (58.8%). The mean age of the malaria medical claims was approximately 25.8 years with most of them in the age group of 0-4 years (16.7%). The 55 – 59 years and 60 years plus age groups recorded the least. (0.2%) This indicates a high prevalence of malaria among children below five years compared to that of the aged. Majority of the medical claims from the Essential facilities (92.5%) the Premier facilities recorded the least of malaria medical claims (1.3%). A greater number of medical claims were from private health facilities in the Greater Accra Region (36.3%). The Brong Ahafo and the Volta Regions recorded the least of malaria medical claims (1.5%) as shown in Table 1

Table 4.1: Background Characteristics of Malaria Medical Claims

Items	Number	Percentage (%)
Sex:		
Male	282	58.8
Female	198	41.2
Age Group (Years):		
0-4	80	16.7
5-9	43	9
10-14	28	5.8
15-19	19	4
20-24	14	2.9
25-29	60	12.5
30-34	74	15.4
35-39	57	11.9
40-44	50	10.4
45-49	34	7.1
50-54	19	4
55-59	1	0.2
60+	1	0.2
Age: Mean (SD)	25.8(15.9)	
Facility Type:		
Essential	444	92.5
Executive	30	6.3
Premier	6	1.3
Region:		
Northern Region	74	15.4
Upper West Region	40	8.3
Upper East Region	24	5
Brong Ahafo Region	7	1.5
Ashanti Region	27	5.6
Eastern Region	27	5.6
Volta Region	7	1.5
Western Region	35	7.3
Central Region	65	13.5
Greater Accra Region	174	36.3
Total	480	100

SD: Standard deviation

4.2 Direct medical cost of managing malaria

The direct medical cost of managing malaria is grouped into three. These are the administrative cost, investigation cost, and medication cost.

4.2.1 Administrative cost of managing malaria

The total administrative cost of managing malaria in private health facilities of NMI was GHS 27, 231.62 representing 51.6% of the total cost of managing malaria. The consultation makes up 47.7% (GHS25, 196.00) of the administrative cost whilst detention constitutes 0.7% (GHS 350.00) as shown in Table 2. The median administrative cost of managing malaria in private healthcare facilities of NMI was GHS50.00 (IQR: GHS40.00, GHS60.00)

4.2.2 Investigation cost of managing malaria

Table 2 shows that the investigation cost of managing malaria constitutes about 25.4% (GHS13, 407.00) of the total cost. Full blood count constitutes 10.1% (GHS5, 314.00) of the investigation cost with fasting blood sugar recording 0.3% (GHS 166.00). The median investigation cost of managing malaria in private healthcare facilities of NMI was estimated at GHS28.00 (IQR: GHS0.00, GHS48.70).

4.2.3 Medication cost of managing malaria

About 23% (GHS 12,186.74) of the total cost of managing malaria was borne by medications as shown in Table 1. Both oral and injectable anti-malaria medication constituted 14.6% of the medication cost whilst oral anti-allergy medications recorded 0.1%. The median medication cost of managing malaria in private healthcare facilities was estimated as GHS 21.69 (IQR: GHS4.50, GHS38.00).

4.2.4 Overall cost of managing malaria

The total direct medical cost of managing malaria in private healthcare facilities of NMI in the year 2018 was estimated at GHS52, 825.40. Administrative cost makes up 51.6% of the total cost whilst medication cost constitutes 23% as shown in Table 2. The overall median cost of managing malaria in private facilities of NMI in the year 2018 was GHS 106.00(IQR: GHS72.35, GHS132.80).

Table 4.2: Cost of managing malaria

Cost Item	Total Cost(GHS)	Number	Mean (GHS)	SD	Median (GHS)	IQR(LQ, UQ)	Cost Profile (%)
Administrative Cost:							
Documentation	1,296.00	69	18.78	11.02	20.00	(10.00,20.00)	2.5
Consultation	25,196.00	480	52.49	24.79	50.00	(40.00,60.00)	47.7
Detention	350.00	8	43.75	19.96	45.00	(32.50, 50.00)	0.7
Consumables	389.62	18	21.65	25.66	8.75	(5.00, 30.00)	0.7
Sub-Total	27,231.62	480	56.73	30.57	50.00	(40.00,60.00)	51.6
Investigation Cost:							
Blood Film	5,209.50	307	16.97	7.32	18.00	(10.00,20.00)	9.9
Rapid Diagnostic Test	390.00	22	17.73	5.45	20.00	(15.00,20.00)	0.7
Full Blood Count	5,314.00	194	27.39	7.34	29.00	(20.00,30.00)	10.1
Fasting Blood Sugar	166.00	11	15.09	6.19	13.00	(10.00,20.00)	0.3
Widal	702.00	44	15.95	6.84	15.00	(10.00,19.00)	1.3
Routine Urine	703.00	41	17.15	7.16	15.00	(15.00,20.00)	1.3
Haemoglobin	284.50	16	17.78	10.49	15.00	(10.00,20.00)	0.5
Others	638.00	17	37.53	31.81	20.00	(19.00,50.00)	1.2
Sub-Total	13,407.00	480	27.93	27.38	28.00	(0.00,48.70)	25.4
Medication Cost:							
Orals							
Anti-Malaria	6,503.13	297	21.9	12.01	17.60	(14.40,28.10)	12.3
Analgesics	2,120.89	333	6.37	6.26	4.62	(2.00,9.60)	4.0
Antibacterial	510.19	23	22.18	13.67	16.52	(9.03,35.00)	1.0
Ant allergy	43.70	8	5.46	8.02	3.00	(1.95,4.25)	0.1
Antitussive	201.79	7	28.83	45.23	10.00	(7.00,27.00)	0.4
Anthelminthic	82.50	7	11.79	9.4	10.00	(4.00,15.00)	0.2
Oral rehydration salt	11.76	7	1.68	1.07	1.66	(0.60,3.00)	0.0
Vitamins	860.25	80	10.75	13.63	6.20	(0.95,15.00)	1.6
Others	170.41	10	17.04	10	19.00	(10.00,27.00)	0.3

Cost Item	Total Cost(GHS)	Number	Mean (GHS)	SD	Median (GHS)	IQR(LQ, UQ)	Cost Profile (%)
Injections							
Anti-Malaria	1,237.85	82	15.1	23.89	10.00	(6.28,15.00)	2.3
Analgesics	176.90	33	5.36	3.43	4.70	(3.80,6.00)	0.3
Antibacterial	20.00	1	20	-	20.00	(20.00,20.00)	0.0
Infusions	229.37	12	19.11	9.69	17.16	(13.28,24.50)	0.4
Others	18.00	3	6	3.61	5.00	(3.00,10.00)	0.0
Sub-Total	12,186.74	480	25.39	25.01	21.69	(4.500,38.00)	23.1
Grand Total	52,825.36	480	110.05	51.62	106.00	(72.35,132.80)	100.0

IQR: Interquartile range, LW: Lower quartile, UQ: Upper quartile, SD: Standard deviation

4.3 Cost profile of malaria management

Figure 1 shows that administrative cost constitutes about 52% (GHS27, 231.62) of the total cost of malaria management in private health facilities of NMI. About 23% (GHS12, 186.74) of the cost is borne by the medications. The total cost of managing malaria for the 2018 fiscal year for private health facilities of NMI was GHS52, 825.36.

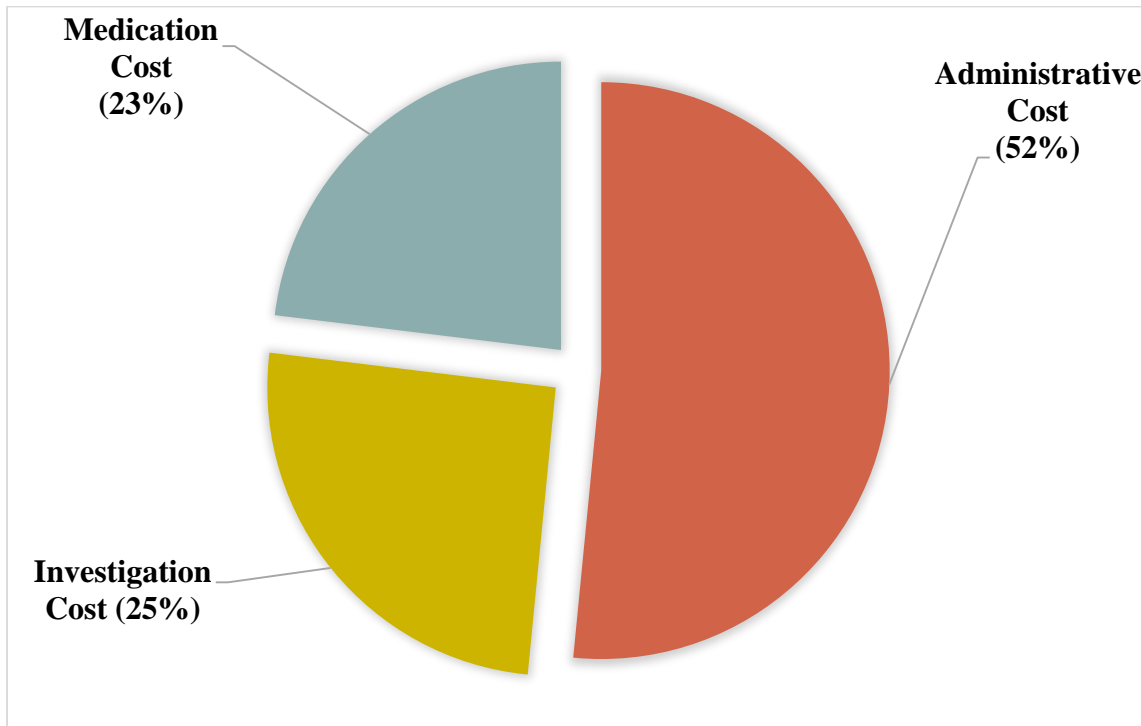


Figure 4.1: Cost profile of malaria

4.4 Regional Total Cost distribution of malaria management

Table 4.3 shows the total cost distribution of malaria management of private healthcare facilities of NMI in the ten regions of Ghana for the year 2018. The Greater Accra Region constituted 43.8% (GHS23, 133.54) with the Volta Region recording 1 % of the total cost of managing malaria in Ghana. The highest median cost of managing malaria among the regions was GHS125.08 (IQR: GHS85.00, GHS168.60). This was recorded in the Greater Accra Region. The Upper East Region recorded the least median cost of managing malaria of GHS

52.00 (IQR: GHS39.45, GHS62.85) in Ghana. The analysis of variance among the direct medical cost for the regions indicated that the regions were significant (p-value = 0.0037).

Table 4.3: Regional distribution of the total cost of managing malaria

Region	Total	Mean	SD	Median	IQR(LQ, UQ)	Cost Profile
	GHS	GHS		GHS	GHS	%
Northern Region						
Administrative Cost	3,710.00	50.14	14.19	50.00	(40.00,50.00)	7.0
Investigation Cost	1,915.00	28.16	8.81	30.00	(30.00,30.00)	3.6
Medication Cost	2,039.08	29.55	14.45	26.28	(20.00,40.20)	3.9
Sub - Total	7,664.08	103.57	24.82	105.00	(89.00,119.14)	14.5
Upper West Region						
Administrative Cost	2,050.00	51.25	3.35	50.00	(50.00,50.00)	3.9
Investigation Cost	1,465.00	54.26	18.17	50.00	(50.00,50.00)	2.8
Medication Cost	649.41	21.65	7.36	20.80	(17.60,26.00)	1.2
Sub - Total	4,164.41	104.11	29.42	107.50	(76.80,125.50)	7.9
Upper East Region						
Administrative Cost	582.00	24.25	8.45	30.00	(20.00,30.00)	1.1
Investigation Cost	175.00	19.44	12.61	10.00	(10.00,25.00)	0.3
Medication Cost	549.40	26.16	17.10	24.00	(16.50,31.08)	1.0
Sub - Total	1,306.40	54.43	18.85	52.00	(39.45,62.85)	2.5
Brong Ahafo Region						
Administrative Cost	300.00	42.86	5.67	45.00	(45.00,45.00)	0.6
Investigation Cost	153.00	30.60	6.84	30.00	(30.00,35.00)	0.3
Medication Cost	143.80	28.76	16.48	21.00	(20.00,42.00)	0.3
Sub - Total	596.80	85.26	30.77	83.00	(60.8,122.00)	1.1
Ashanti Region						
Administrative Cost	1,318.72	48.84	9.76	50.00	(40.00,50.00)	2.5
Investigation Cost	952.00	47.60	31.98	42.50	(30.00,54.00)	1.8
Medication Cost	755.20	32.83	19.90	28.00	(17.00,47.20)	1.4
Sub - Total	3,025.92	112.07	46.62	100.00	(86.68,138.40)	5.7
Eastern Region						
Administrative Cost	1,080.00	40.00	6.20	40.00	(40.00,40.00)	2.0
Investigation Cost	954.00	45.43	15.77	48.00	(42.00,52.00)	1.8
Medication Cost	1,162.02	44.69	30.79	39.50	(33.00,49.00)	2.2
Sub - Total	3,196.02	118.37	43.18	109.00	(90.00,133.00)	6.1
Volta Region						
Administrative Cost	260.00	37.14	4.88	40.00	(30.00,40.00)	0.5
Investigation Cost	60.00	15.00	5.77	15.00	(10.00,20.00)	0.1
Medication Cost	201.00	33.50	13.98	35.50	(22.00,38.00)	0.4
Sub - Total	521.00	74.43	15.35	82.00	(55.00,85.00)	1.0
Western Region						
Administrative Cost	1,559.00	44.54	17.71	40.00	(30.00,50.00)	3.0
Investigation Cost	549.00	34.31	21.32	37.50	(15.00,52.50)	1.0

Region	Total	Mean	SD	Median	IQR(LQ, UQ)	Cost Profile
	GHS	GHS		GHS	GHS	%
Medication Cost	787.29	29.16	17.86	27.51	(14.49,43.55)	1.5
Sub - Total	2,895.29	82.72	40.36	72.91	(51.20,112.70)	5.5
Central Region						
Administrative Cost	3,112.50	47.88	19.42	45.00	(35.00,50.00)	5.9
Investigation Cost	2,030.00	53.42	36.85	49.40	(25.00,60.00)	3.8
Medication Cost	1,179.40	25.09	14.90	18.96	(13.00,37.78)	2.2
Sub - Total	6,321.90	97.26	44.38	97.78	(60.00,120.80)	12.0
Greater Accra Region						
Administrative Cost	13,259.40	76.20	39.72	70.00	(50.00,90.00)	25.1
Investigation Cost	5,154.00	41.23	23.06	42.00	(20.00,60.00)	9.8
Medication Cost	4,720.14	36.59	32.21	28.70	(17.00,50.08)	8.9
Sub - Total	23,133.54	132.95	62.41	125.08	(85.00,168.60)	43.8
Grand - Total	52,825.36	110.05	51.62	106.00	(72.35,132.80)	100.0

IQR: Interquartile range, LW: Lower quartile, UQ: Upper quartile, SD: Standard deviation

4.5 Total cost of malaria management by facility type

Table 4.4 shows that the Essential facilities constituted about 90.3% (GHS 47,720.73) of the total cost of managing malaria with a median cost of GHS 103.83 (IQR: GHS70.00, GHS129.80) whereas the Premier facilities constituted only 1.9% (GHS1, 004.33) of the total cost with a median cost of GHS173.40 (IQR: GHS155.00, 222.54) The analysis of variance among the cost for the facility types was statistically significant (p-value = 0.0001).

Table 4.4: Total cost of malaria management by facility type

Facility type	Total	Mean	SD	Median	IQR(LQ, UQ)	Cost Profile
	GHS	GHS		GHS	GHS	%
Essential						
Administration	24,441.22	55.05	28.93	50.00	(40.00,60.00)	46.3
Investigation	12,451.00	40.56	24.07	38.00	(28.00,52.00)	23.6
Medication	10,828.51	30.68	24.16	26.00	(16.20,40.20)	20.5
Sub- Total	47,720.73	107.48	50.20	103.83	(70.00,129.80)	90.3
Executive						
Administration	2,129.40	70.98	39.02	60.00	(40.00,100.00)	4.0
Investigation	680.00	32.38	24.42	20.00	(20.00,35.00)	1.3
Medication	1,290.90	46.10	17.07	49.43	(43.40,54.10)	2.4
Sub- Total	4,100.30	136.68	57.08	129.65	(103.40,160.93)	7.8
Premier						
Administration	661.00	110.17	40.65	100.00	(100.00,145.00)	1.3
Investigation	276.00	55.20	22.81	55.00	(55.00,60.00)	0.5

Medication	67.33	33.67	40.84	33.67	(4.79,62.54)	0.1
Sub- Total	1,004.33	167.39	65.79	173.40	(155.00,222.54)	1.9
Grand Total	52,825.36	110.05	51.62	106.00	(72.35,132.80)	100.0

IQR: Interquartile range, LW: Lower quartile, UQ: Upper quartile, SD: Standard deviation

4.6 NHIS Age classification of cost of malaria management

Table 4.5 shows the NHIS age classification of the cost of managing malaria. The below 12 years' age group represented 26.6% (GHS14, 058.20) of the total cost with a median cost of GHS96.00 (IQR: GHS65.00, GHS125.9). The 12 years and above age group recorded a median cost of GHS106.41 (IQR: GHS76.80, GHS134.00). The analysis of variance between the median direct medical cost for the NHIS age classification was significant (p-value = 0.0461).

Table 4.5: NHIS Age Classification of cost of malaria management

Age Group	Total	Mean	SD	Median	IQR(LQ, UQ)	Cost Profile
	GHS	GHS		GHS	GHS	%
< 12 years old:						
Administration Cost	7,309.22	54.14	31.39	50.00	(40.00,60.00)	13.8
Investigation Cost	3,621.70	40.69	25.03	32.00	(25.00,54.00)	6.9
Medication Cost	3,127.28	28.17	15.68	25.00	(15.00,36.80)	5.9
Sub - Total	14,058.20	104.13	51.36	96.00	(65.00,125.94)	26.6
≥ 12 years old:						
Administration Cost	19,922.40	57.75	30.23	50.00	(40.00,60.00)	37.7
Investigation Cost	9,785.30	40.10	23.89	35.00	(20.00,52.00)	18.5
Medication Cost	9,059.46	33.31	26.62	27.58	(17.65,45.56)	17.1
Sub - Total	38,767.16	112.37	51.61	106.41	(76.80,134.00)	73.4
Grand Total	52,825.36	110.05	51.62	106.00	(72.35,132.80)	100.0

IQR: Interquartile range, LW: Lower quartile, UQ: Upper quartile, SD: Standard deviation

4.7 Sensitivity analysis

To check the robustness of the cost estimate for managing malaria, a one-way and multi-way sensitivity analysis of cost was done. The cost of oral anti-malaria medication and consultation were changed by 3%, 5%, and 7% to estimate the cost of managing malaria in private health facilities of NMI. These were selected due to the high unpredictability associated with them.

As shown in Table 4.6, a 3% increase in oral anti-malaria medication results in an increase in the total cost of managing malaria by 0.4%. This resulted in a 0.3% and a 0.1% fall in administrative cost and medication cost respectively. Medication cost, on the other hand, recorded a 0.3% increase in cost. A 7% increase in oral anti-malaria medications showed similar trends

A 3% increase in consultation only led to a 1.4% increase in total cost, with the investigation and medication component of total cost reducing by 0.3% and 0.4% respectively and administrative cost increasing by 0.6%. A similar observation holds when the consultation was varied to 7%.

A 3% increase in both oral anti-malaria medication and consultation fee led to a 1.8% increase in total cost with the administrative cost accounting for 52.0% of the cost and medication cost 23%. Similar trends were observed when the consultation and oral anti-malaria was varied to 7%.

Table 4.6: Sensitivity Analysis of the Cost of Malaria Management

Scenario	Cost component	Change in parameter	TC	Change in TC	% of TC			% change in cost		
					AC	IC	MC	AC	IC	MC
		%	GHS	%	%	%	%	%	%	%
Best scenario	Baseline	0	52,825.36	-	51.6	25.4	23.1	-	-	-
One way Sensitivity	Anti-malaria (oral)	3	53,020.45	0.4	51.3	25.3	23.4	-0.3	-0.1	0.3
		5	53,150.52	0.6	51.2	25.2	23.5	-0.4	-0.2	0.4
		7	53,280.58	0.9	51.1	25.2	23.7	-0.5	-0.2	0.6
One way Sensitivity	Consultation	3	53,581.24	1.4	52.2	25.0	22.7	0.6	-0.4	-0.4
		5	54,085.16	2.4	52.7	24.8	22.5	1.1	-0.6	-0.6
		7	54,589.08	3.3	53.1	24.6	22.3	1.5	-0.8	-0.8
Multi-way sensitivity	Oral anti-malaria & consultation	3	53,776.33	1.8	52.0	24.9	23.0	0.4	-0.5	-0.1
		5	54,410.32	3.0	52.4	24.6	23.0	0.8	-0.8	-0.1
		7	55,044.30	4.2	52.7	24.4	23.0	1.1	-1.0	-0.1

TC: Total cost, AC: Administrative cost, IC: Investigation cost, MC: Medication cost

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The findings of the study are discussed in this chapter. Discussions will concentrate on the various cost components of managing malaria regarding the objectives of the study, other related literature on the cost of managing malaria and the background characteristics of the malaria medical claims.

5.1 Background Characteristics

Four hundred and eighty malaria medical claims were processed for this study of which 58.8% (282) of the malaria claims were males while 41.2% (198) were females. This is in contradiction to a study conducted in Nigeria by Ali (2017) which recorded a 54% female to a 46% male. This could probably be attributed to contextual factors of the study area and the data processed. The mean age of the medical claims was estimated at 25.80 years (median: 29 years). The study revealed that approximately, 16.7% of the medical claims were aged between 0 – 4 years. This aligns with global statistics and studies by Phillips, (2001) which states that children under 5 years of age are at higher risk of malaria. Similarly, WHO (2018) also confirms the vulnerability of under 5 years accounting for about 61% of malaria deaths worldwide. Per the facilities types of Nationwide Medical Insurance, 92% (444) of the medical claims came from the Essential facilities with 6.2% (30) from the Executive facilities. The Premier facilities recorded approximately 1.3% of the total number of medical claims. The study has revealed a high utilization of Essential facilities on the scheme.

Furthermore, the study revealed that the Greater Accra Region recorded about 36.3% (170) of the malaria medical claims in private healthcare facilities in Ghana. This was followed by the Northern Region with about 15.4% (74) of the medical claims. The Central and Upper West

Regions recorded 13.5% (65) and 8.3% (40) of total medical claims. Brong Ahafo and Volta Regions recorded 1.5% (7) each of the malaria medical claims. About 7.3% (35) and 5.6% (27) of the medical claims were recorded in the Western and Ashanti Regions respectively. This finding contradicts the findings of GSS et al, (2017) which establishes the Central Region with the highest (31%) number of malaria cases with the Eastern Region having 30%. The Northern Region was estimated to have 25% whilst the Volta Region recorded 28%. This difference can be attributed to the dense population of private health facilities in the Greater Accra Region compared to the other regions hence having a higher number of medical claims.

5.2 Direct medical cost of managing malaria

The cost for management of malaria at the various private health facilities of NMI is categorized into three components, thus administrative, investigation and medication cost. The total direct medical cost of managing malaria in private healthcare facilities of NMI in Ghana for the 2018 fiscal year was estimated at GHS52, 825.36 (USD 10,959.62).

The administrative cost of managing malaria in private health facilities of NMI in 2018 was estimated at GHS 27,231.62 (USD 5,649.71) of the total cost of managing malaria with a mean cost of GHS 56.73 (USD 11.77) per malaria patient and median of GHS 50.00 (USD 10.37). This constituted about 52% of the total cost profile of malaria management in private healthcare facilities of NMI. The findings confirm studies by Abotsi (2012) which revealed a higher (44.4%) proportion of the cost of managing complicated malaria to administrative cost which was USD 20.70. It was further revealed in his studies that for simple malaria 25.6% of the cost is constituted by administrative cost which was USD 2.61. However, a similar study in private healthcare facilities in Nigeria contradicts these findings thus administrative cost constituting 10.3% of the total direct medical cost which was USD 1.36. (Salawu et al.,

2016). This contradiction may be due to contextual factors in both studies and the influence of private high influence of private health facilities on the cost of administrative services.

The cost of diagnosing malaria in private healthcare facilities of NMI in 2018 was estimated at GHS 13,407.00 with a mean cost of GHS 27.93 (USD 5.80) per an episode of malaria and a median of GHS 28.00 (USD 5.81). This constituted about 25% of the total direct medical cost of managing malaria in private healthcare facilities of NMI. Investigations cost of managing malaria in this study is relatively high in comparison to similar studies in the country and the sub-region. For instance, Abotsi (2012) and Dalaba et al (2018) estimated the average investigation cost of managing malaria to be USD 4.27 and USD 2.09 in the Upper East and Upper West Regions of Ghana respectively. White et al (2011), estimated the median cost of diagnosing a malaria case was USD 4.32. In Nigeria, Salawu et al. (2016) estimate 27.7% of the cost profile of managing malaria in private health facilities to be attributed to investigation cost. He estimated the average cost of the investigation to be USD 3.56. From the aforementioned studies, it is clear that the investigation cost of malaria is relatively high. Though the study did not consider to find out the cause of the high cost of investigation, these high cost could probably be attributed to other laboratory investigations which do not necessarily add to the diagnosis for malaria.

The administrative cost of managing malaria in private health facilities of NMI in the 2018 fiscal year accounted for GHS 12,186.70 (USD 2,528.36) of the total cost of managing malaria with a mean cost of GHS 25.39 (USD 5.27) per malaria patient and median of GHS 21.69 (USD 4.5). This constituted about 23% of the total cost profile of managing malaria in private healthcare facilities of NMI in the 2018 fiscal year. The findings of this are not different from a study by Ezenduka et al (2017) which estimated the average medication cost of an episode of malaria to be USD 5.77. Other studies are however in contrast to study results obtained. For instance, Dalaba et al. (2018) estimated the medication cost of malaria

to be USD 4.03 in the Upper West Region of Ghana. In the Upper East Region of Ghana, a study by Abotsi (2012) revealed medication cost to constitute about 11% of the total cost for managing malaria with an average of USD 5.10 and USD 1.99 for complicated and simple malaria respectively. Deressa et al (2007) and Castillo-Riquelme et al (2008) estimated medication cost for an episode of malaria to be USD 2.48 and USD 2.53 for Ethiopia and Mozambique respectfully. In Nigeria, Ezenduka et al (2017), also estimated the cost of malaria medication to be USD 2.35. This contrast can probably be attributed to some contextual factors. However, in a similar study in Nigeria, medication cost constitutes about 62% of the total cost of malaria with an average cost of USD 8.17 which is higher than the cost in this study. The medication cost of managing malaria in private health facilities is said to be relatively high. This contradiction is likely to be attributed to the supply of branded medication and co-medication.

5.3 Total cost of managing malaria

The total direct medical cost of managing malaria in private health facilities of NMI in the 2018 fiscal year was estimated at GHS 52, 825.36 (USD 10,959.62). The average medical cost of managing malaria was estimated at GHS 110.05 (USD 22.83) with a median of GHS 106.00 (USD 21.99). The findings of this study are high compared to other studies in Ghana and the sub-region. The following are some studies on the direct medical cost of managing malaria in Ghana. For Instance, Tawiah et al (2016) estimated the direct medical cost of managing malaria in the middle zone as USD 2.76 whereas Dalaba et al (2018) estimated it as USD 4.13 in the Upper West Region. Similar studies by Akazili et al (2011) and Sicuri et al (2013) estimated the cost of managing malaria as USD 1.87 and USD 5.7 respectively. Abotsi (2012) however estimated the cost of managing malaria as USD 32.14 in the Upper East region.

Salawu et al (2016) estimated the cost of managing an episode of malaria in private health facilities in Nigeria to be USD 13.08. Similarly, Ezenduka et al (2017) did estimate USD 31.49 for the treatment of uncomplicated malaria. Deressa et al. (2007) also estimated the cost of managing malaria in private healthcare facilities in Ethiopia to be USD 2.76. Though the estimated cost of malaria in this study is considered relatively high, the estimates of Abotsi (2012) and Ezenduka et al (2017) are higher. The high cost of malaria management can be attributed to high service charges in private health facilities with co-investigations and co-medications.

5.4 NHIS Age Classification of cost of malaria management

This study revealed that the average cost of managing an under 12 years and 12 years and above old to be GHS 104.13 (USD 21.60) and GHS 112.37 (USD 23.41) with a median of GHS 96.00 (USD 19.92) and GHS 106.41(USD 22.08) respectively per an OPD episode of malaria. This is outrageously high compared to that of NHIS (2015) which is GHS 15.71 and GHS16.07 for less than 12 years and 12 years and above respectively even though medication cost is not included. The cost per the NHIS low because services are restricted and only specific laboratory investigation can be considered for a malaria diagnosis unlike the finding of this study.

The outcome of the sensitivity analysis showed substantial changes with a unit change in the anti-malaria medication and consultation cost. This indicates the suitability of the variables selected.

The findings found in this study, align with the conceptual framework with inter-relations among the cost elements and the cost of managing malaria. The study was able to estimate the various cost components associated with the treatment of managing malaria in private healthcare facilities of NMI, it also established the cost profile of each cost item to the total

cost of managing malaria. The conceptual framework of the study is therefore suitable and served as a valuable theoretical basis for arriving at the outcomes of the study.

5.4 Study Limitation

The study was an institutional-based one, this limited the scope of the data extracted. Nonetheless, the findings are relevant since the institution is prominent in the private healthcare financing industry. Secondly, estimating only the direct medical cost borne by patients without considering other costs and against income earned is considered as a one-sided study. Again only 'one-stop-shop' private facilities were considered hence limiting the study. Lastly, since data used in this study was a secondary one, there is the possibility of error or omission or commission which could have led to an understatement or overstatement of the cost. This was however catered for in the sensitivity analysis.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

Conclusion

The cost of managing malaria in private healthcare facilities of NMI is high. The administrative cost was identified to be the main cost driver of malaria management in private health facilities in NMI. It constituted more than half of the total cost of managing malaria in the 2018 fiscal year. This was followed by the investigation cost and medication cost respectively.

Recommendation

The recommendations of the study are as follows:

1. The findings of the cost of malaria in private health facilities should be used to forecast the future cost of managing malaria to enhance the planning and budgeting for malaria management.
2. Given the high cost of malaria management in private health facilities, similar studies should be conducted in public health and mission facilities to ascertain the cost of malaria.
3. The findings of the cost of malaria in private health facilities should be used as a basis for reviewing the NHIS pricing. Health technology assessment should also be employed to achieve the most cost-effective anti-malaria medication and diagnosis which will intend to reduce the cost of managing the disease.

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Appendix 1: Data Extraction Form for Estimating Cost for Malaria

BACKGROUND					
ID	AGE	SEX	REGION	FACILITY TYPE	SERVICE TYPE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

ADMINISTRATIVE COST						
ID	REGISTRATION	CONSULTATION	WARD/DETENTION	NURSE/DOCTORS CARE	CONSUMEABLES	OTHERS
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

ID	INVESTIGATION COST					
	BF	RDT	FBC	FBS	SICKLING	URINE / STOOL
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

ID	MEDICATION COST					
	ORALS					
	ANTIMALARIAS	ANALGESICS	ANTIBACTERIAL	ANTI ALLERGY	ANTIHELMINTHIC	VITAMINS
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

ID	MEDICATION COST					
	INJECTIONS					
	ANTIMALARIAS	ANALGESICS	ANTIBACTERIAL	ANTI ALLERGY	ANTIHELMINTHIC	VITAMINS
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

Appendix 2: Approval from Nationwide Medical Insurance

Memorandum



TO: THE CHIEF EXECUTIVE OFFICER
FROM: AUGUSTUS OSAFO-SAMPONG *Augustus*
SUBJECT: PERMISSION TO USE THE SCHEMES DATA FOR MY DISSERTATION
DATE: 28th FEBRUARY, 2018.

With reference to the subject above, I humbly request your approval for the use of Nationwide Medical Insurance medical claims data for my dissertation in partial fulfillment of the requirement for the award of MPH degree.

I would like to state that the data will solely be used for the purpose stated and under no circumstance will it be released to any third party.

Kindly find attached the necessary documentation.

Counting on your cooperation

Thank you.

Augustus Osafo-Sampong

*Approved
use data in
anonymised form
1/07/2018*

Appendix 3: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.



*MyRef. GHS/RDD/ERC/Admin/App
Your Ref. No.*

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
GPS Address: GA-050-3303
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com
14th May, 2019

Augustus Osafo-Sampong
University of Ghana
School of Public Health
Legon

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.


GHS-ERC Number	GHS-ERC 037/04/19
Project Title	Assessment of Cost of Malaria Management in Private Health Facilities of Nationwide Medical Insurance Ltd in Ghana
Approval Date	14 th May, 2019
Expiry Date	13 th May, 2020
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....

 Professor Moses Aikins
 (GHS-ERC Vice Chairperson)