DETERMINANTS OF HEALTH CARE SEEKING PATTERNS
AND OUT-OF-POCKET EXPENDITURE FOR MALARIA
TREATMENT IN ZAMBIA

by

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LUSAKA

2015
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I, Kangwa Koota Musole, declare that this dissertation:

(a) Represents my own work;
(b) Has not previously been submitted for a degree at this or any other University; and
(c) Does not incorporate any published work or material from another dissertation.

Signed………………………………………..

Date…………………………………………..
APPROVAL

This dissertation of Kangwa Koota Musole has been approved as a partial fulfilment of the requirements for the award of the degree of Master of Arts in Economics by the University of Zambia.

Signed: _______________________________   Date: _______________________________

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ABSTRACT

Malaria illness places a severe burden on Zambia’s health sector and the country’s economic development. Despite being curable when treatment is sought appropriately, utilization of professional health care services amongst people suffering from malaria illness generally continues to be low in Zambia. With a lack of recent empirical evidence following several advances in Zambia’s campaign against malaria, we are uncertain of the current determinants of health care seeking patterns and out-of-pocket expenditures associated with seeking professional malaria treatment in Zambia.

This study used data from the 2013 Zambia Household Health Expenditure and Utilisation Survey to investigate the determinants of health care seeking patterns and out-of-pocket expenditures associated with seeking professional malaria treatment. A Multinomial logistic regression model was used to investigate the former while the latter was investigated with a two part regression model.

The study findings reveal urban residency, a higher level of the household head’s education, lower age of the ill individual and higher income to be associated with an increased probability of seeking appropriate malaria treatment. In addition, out of pocket expenditures are positively influenced by urban residency, greater distance travelled in seeking treatment, higher income, increased household head’s education and seeking professional care outside the public sector.

From the findings, it is recommended that the government should continue with the construction of primary health care facilities in order to reduce the distances travelled and the costs incurred in seeking professional malaria treatment services, especially in the rural areas. It is also recommended that the government escalates awareness campaigns to encourage individuals to seek appropriate malaria treatment and caution on the dangers of self-medication, especially among the male population. Policy makers should also consider training personnel in drug stores on the diagnosis and appropriate treatment of malaria since self-medication is a popular health care option for many Zambians. Finally, it is recommended that the government considers policies to ensure equity in the utilization of malaria treatment services especially among households with lower income and individuals with little or no formal education. Future research may consider a full analysis of the annual disease burden of malaria in Zambia as well as an examination of expenditures associated with in-patient treatment and self-medication for malaria.
DEDICATION

This study is dedicated to my parents Mr Nameto Muyunda Musole and Mrs Juliet Musole.
ACKNOWLEDGEMENTS

I wish to acknowledge the full sponsorship I received from the Bank of Zambia to pursue the Masters’ programme.

I am grateful to Dr F. Masiye for his guidance, encouragement and mentorship during the period he supervised me as I worked on my dissertation.

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My entire family has been instrumental to my academic attainments thus far and I am particularly thankful to my parents, my sister Rosemary and my brothers, David, Muyunda and Inambao for the important role they have played in my life.

To my class mates I say thank you for the encouragement and let us carry on with the enthusiasm and positive attitude towards life.

Finally and most importantly, I wish to thank the Lord for his continued guidance and blessings.
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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Artemisin-based Combination Therapy</td>
</tr>
<tr>
<td>ANC</td>
<td>Antenatal Care</td>
</tr>
<tr>
<td>CHAZ</td>
<td>Churches Health Association of Zambia</td>
</tr>
<tr>
<td>GFATM</td>
<td>Global Fund to fight AIDS, TB and Malaria</td>
</tr>
<tr>
<td>GRZ</td>
<td>Government of the Republic of Zambia</td>
</tr>
<tr>
<td>IPTP</td>
<td>Intermittent Preventive Treatment during Pregnancy</td>
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<td>IRS</td>
<td>Indoor Residual Spraying</td>
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<td>IVM</td>
<td>Integrated Vector Management programme</td>
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<tr>
<td>LCMS</td>
<td>Living Conditions Monitoring Survey</td>
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<tr>
<td>LLIN</td>
<td>Long-Lasting Insecticide Treated Nets</td>
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<td>MIP</td>
<td>Malaria in Pregnancy</td>
</tr>
<tr>
<td>MIS</td>
<td>Malaria Indicator Survey</td>
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<tr>
<td>MoH</td>
<td>Ministry of Health</td>
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<tr>
<td>NHA</td>
<td>National Health Accounts</td>
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<tr>
<td>NHSP</td>
<td>National Health Strategic Plan</td>
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<td>NMCC</td>
<td>National Malaria Control Centre</td>
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<tr>
<td>NMSP</td>
<td>National Malaria Strategic Plan</td>
</tr>
<tr>
<td>PMI</td>
<td>President’s Malaria Initiative</td>
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<tr>
<td>RBM</td>
<td>Roll Back Malaria</td>
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<tr>
<td>RDT</td>
<td>Rapid Diagnostic Test</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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CHAPTER ONE
INTRODUCTION

1.0. Background of the Study

Malaria remains a leading cause of health burden and economic loss in the developing world. In 2013 alone, there were 198 million cases of malaria globally and 584,000 deaths were attributable to malaria. Sub-Saharan Africa accounts for a disproportionately high burden of malaria, mostly among children living in Africa where it is estimated that a child dies from malaria every minute. Through global efforts coordinated by Roll Back Malaria (RBM), Global fund to fight AIDS, Tuberculosis and Malaria (GFATM), Presidents Malaria Initiative (PMI), World Health Organisation (WHO), Clinton Health Access Initiative (CHAI) and other partners, many countries have scaled up programmes aimed at controlling the burden of malaria. As a result, recent data show that mortality rates attributed to malaria have fallen by 47 per cent globally and by 54 per cent in the World Health Organisation (WHO) African region between 2000 and 2013. Yet, malaria still continues to pose an epidemiological and economic challenge especially in Sub-Saharan Africa where 90 per cent of global malaria deaths occur (www.who.int).

Malaria is caused by plasmodium parasites which are spread to people bitten by infected anopheles mosquitoes also known as malaria vectors. The four parasite species that cause malaria in humans are plasmodium falciparum, plasmodium vivax, plasmodium malariae and plasmodium ovale. Plasmodium falciparum and plasmodium vivax are the most common, and plasmodium falciparum is the deadliest malaria vector (Ibid). Plasmodium falciparum is the predominant malaria vector in Zambia accounting for 98 per cent of all infections (NMSP, 2012).

Malaria poses a significant health and economic burden to Zambia. In 2012 alone, the country recorded 4.8 million suspected cases of malaria (representing 358 cases per 1,000 of the population) and 3,000 deaths were attributable to malaria. Malaria accounts for 40 per cent of all outpatient attendance in Zambian health facilities with children and particularly infants being the most severely affected as it is responsible for up to 40 per cent of all infant deaths and nearly 20 per cent of deaths among children under the age of five in Zambia (WHO, 2011; 2012).
Health loss due to malaria as measured by Disability-Adjusted Life Years (DALYs) shows that malaria exerts a significant fatal and non-fatal impact on society. In 2010, a total of 1,115,000 years of life lost (YLL) were due to malaria or 13.4 per cent of total YLL from all causes. Disability adjusted life years (DALYs) lost in Zambia due to malaria are 6.8 million which exceeds that of respiratory infections (5.4 million) and HIV and AIDS (3.2 million) according to the World Health Organisation (2011). DALYs are high because malaria affects mostly children because they have lower levels of immunity against the disease.

Aside from its health impact, malaria is also associated with a significant economic burden in several tropical counties including Zambia. Studies which have considered the impact of malaria on economic growth include those by Gallup and Sachs (2001) who established that a 10 per cent reduction in malaria incidence was associated with a 0.3 per cent higher growth rate of GDP. Having controlled for several factors including economic policy, initial levels of poverty, tropical location and life expectancy, the study further revealed that malaria intensive countries grew 1.3 per cent less annually per capita compared to those that were not malaria intensive.

For example, the economic cost of malaria in children in Ghana, Tanzania and Kenya showed that total annual costs were estimated at US$37.8 million, US$131.9 million and US$109 million in Ghana, Tanzania and Kenya, respectively (Sicuri et al., 2013). In analysing the economic impact of malaria in Kenya and Nigeria, Leighton and Foster (1993) had earlier shown that the health costs of malaria on individuals and the government were large and more significant than the burden from lost productivity, which was also found to be significant.

Lost productivity, increased health care spending and increased employee absenteeism from malaria illness also lead to reduced profits for firms. In a study involving three Zambian companies, Mopani Copper Mines, Konkola Mining Company and Zambia Sugar Company it was estimated that the companies gained an annualised internal rate of return (IRR) of at least 28 per cent following the successful implementation of malaria control programmes (WHO, 2011).

Furthermore, malaria illness results in households withdrawing labour from agricultural activity or other form of income generating venture to tend the sick. This results in lost production and impoverishment. Masiye and Fink (2015) report that productivity gains of 10 per cent for maize and 20 per cent for cotton could be obtained from improved malaria prevention through increased use of bed nets in rural Zambia.
In addition, there is also a burden placed on households when children are sick. In Zambia, the peak of malaria cases is in the rainy season during which conditions are most suited for mosquitoes to breed. It is also during the rainy season that farmers are most engaged in their fields and there may be lost output if they have to attend to their ill children at home or they have to travel a long distance to seek treatment. Thus, in addition to posing a health and economic burden, malaria may also impinge on output of the agriculture sector.

Zambia has so far adopted several policies aimed at the prevention and early treatment of malaria cases. The policies on prevention have largely been propagated through the Integrated Vector Management (IVM) programme adopted by the Ministry of Health which is characterised by the use of long lasting insecticide treated nets and the indoor residual spraying programme, with the larval control measures not having been implemented on a large scale. The government has also implemented the malaria in pregnancy (MIP) policy as part of the antenatal care (ANC) clinic. In addition to prevention programmes, the malaria control programme is built on accurate diagnosis and case management of malaria. Accurate diagnosis has been promoted through the use of rapid diagnostic tests (RDTs), while the government has adopted artemisinin-based combination therapy (ACTs) in treating malaria cases (NMSP, 2012).

The number of patients with symptomatic fever being given anti-malaria drugs has been declining over the years, in part because RDT results indicate that they do not have malaria. Overall treatment of febrile children with anti-malarial drugs declined from 52.8 per cent in 2006, to 43.1 per cent in 2008, to 34 per cent in 2010, but increased slightly to 36.9 per cent in 2012. Whereas there have been gains in diagnosis of malaria, the figures clearly indicate a need for increased efforts in promoting RDT usage (NMSP, 2012).

According to the National Malaria Strategic Plan running to the year 2012, Zambia aimed to treat 85 per cent of patients within 24 hours of symptom onset and prompt presentation of febrile children to health facilities was identified as essential to meeting this target. Among children under the age of five with a fever in the two weeks prior to the 2012 National Malaria Indicator Survey (MIS), only 24.5 per cent had sought treatment from a health facility/provider within 24 hours, representing a decline from 31.2 percent in 2010 and 64 per cent in 2008. The health care seeking patterns observed among under five children are reflective of health care seeking patterns for malaria treatment among the general population in Zambia. The timely utilisation of formal health
care providers amongst persons with malaria symptoms in Zambia continues to be low (MIS, 2012). This not only reduces one’s chances of surviving the disease, but it also imposes a more significant economic burden to the country.

1.1. **Statement of the Research Problem**

Malaria is a leading cause of morbidity and mortality in Zambia and it continues to pose a significant burden to the country’s human and economic development primarily through premature deaths, decreased household and employee productivity, and significant health care expenditures. Yet it is curable if treatment is sought early and obtained from appropriate health care providers.

Since 1998, the government has scaled up interventions to combat malaria in Zambia yet many people still do not utilise appropriate health care services when they fall ill. As an illustration, three out of four under-five children with malaria symptoms do not seek professional care within the recommended 24 hours from the onset of symptoms (NMSP, 2012). The low timely utilisation of appropriate health care services among persons suffering malaria illness not only reduces their chances of surviving the disease, but also increases the economic burden of malaria. We have little understanding of the factors that currently affect the health care seeking patterns and out-of-pocket expenditures associated with seeking professional malaria treatment in Zambia. A better understanding of these factors is likely to increase the timely utilisation of health care services amongst persons with malaria through better informed policy and it is in turn expected that the increased utilisation of healthcare facilities by people with malaria will lower the economic burden of malaria in Zambia.

1.2. **General Study Objective**

The general objective of this study was to investigate the factors that determine utilisation of health care services among individuals with malaria in Zambia.

1.3. **Specific Objectives**

The specific objectives of the study were to:

i. Determine the factors that influence the decision by individuals with malaria to either seek professional treatment, self-medicate or do nothing; and
ii. Examine factors that influence the magnitude of out-of-pocket expenditures associated with seeking malaria treatment.

1.4. Statement of Hypotheses

i. The decision by individuals with malaria to either seek professional treatment, self-medicate or do nothing is not influenced by demographic and socio-economic characteristics of the household; and

ii. The magnitude of out-of-pocket expenditures associated with seeking professional malaria treatment are not influenced by provider characteristics, and, demographic and socio-economic characteristics of the household/individual.

1.5. Justification and Significance of the Study

This study was motivated by a number of considerations. First, there is a paucity of literature on the demand for illness treatment services and expenditures associated with seeking professional malaria treatment in Zambia. Hjortsberg (2003) provides the only refereed publication on demand for curative treatment and the determinants of health care expenditures on Zambia in addition to an unpublished study by Diop et al. (1998). In this study, we build on these empirical studies which considered health care seeking behaviour for general illnesses to analyse health seeking behaviour for malaria treatment.

Health care seeking behaviour is a complex process that is influenced by several factors including anticipated costs of treatment and a patients’ judgment of the intensity of sickness (Nyamongo, 2002). It cannot be certain that the factors that influence health care seeking patterns in the case of suffering from any illness similarly affect the health care seeking patterns for malaria treatment. It is possible that the demand for treatment services may vary for the same individuals or communities when faced with different illnesses (Hausmann-Muela et al. (2003); Mackian (2003)). By focusing on malaria, the study aimed to generate a better understanding of some of the factors that specifically influence treatment seeking behaviour among individuals with malaria as well as the determinants of the expenditures associated with seeking professional malaria treatment in Zambia.
The study focuses on malaria treatment partly because Zambia has signed up to global malaria treatment coverage targets. Specifically, the country hopes to achieve 80 per cent coverage of malaria treatment by the year 2015. A study on determinants of malaria treatment and the cost burden of seeking treatment would inform progress towards the Roll Back Malaria (RBM) targets and Millennium Development Goals (MDGs).

Another justification for this study is that since 1998, the Zambian health care landscape has changed significantly. Within the malaria programme, Zambia has implemented several programmes including the distribution of insecticide treated nets (1998), indoor residual spraying (2003) and adopted a new treatment regimen called artemesimin-based combination therapies (ACTs) in 2003. The government has abolished user fees in the public sector (2006 in rural areas and subsequently 2011 in urban areas). These policies and programmes have been coupled with numerous infrastructure development projects across the country and they are likely to have impacted on the demand for malaria treatment services and the expenditures associated with seeking formal malaria treatment in the period after the two related studies were conducted. Hence, the main motivation in this study was to provide new evidence on this subject.

Finally, this study sought to contribute to the literature on this subject and provide a point of reference for further related studies on Zambia and other countries affected by malaria.
CHAPTER TWO

A DESCRIPTION OF THE ZAMBIAN HEALTHCARE SECTOR AND MALARIA INTERVENTIONS IN ZAMBIA

2.0. A Description of the Zambian HealthCare Sector

Since the adoption of a liberalised economic system in 1991 in Zambia, there has been a drive to decentralise the health sector and encourage the planning and delivery of health services at the district as opposed to the national level. The decentralisation programme has however not yet been fully effected.

The Ministry of Health (MoH) headquarters is responsible for the overall management and co-ordination of the formal health system in Zambia. The Provincial Health Office (PHO) is mandated to co-ordinate health service delivery in respective provinces while District Health Offices (DHOs) exist to co-ordinate health service delivery within the district. Neighbourhood health committees were established as a link between communities and the formal health system.

The National Malaria Control Centre (NMCC) is a department under the directorate of public health and research under the Ministry of Health that is responsible for the implementation of the National Malaria Control Programme. The NMCC is responsible for providing technical leadership, guidance, co-ordination, and control of malaria interventions in Zambia. It also serves as the secretariat for RBM activities.

The following Figure summarises the structure of the Zambian health sector as it relates to malaria.
Figure 1: Summary of Zambia's NMCP structure


Individual health providers by type include the public health sector, which is the conduit through which most programmes of the Ministry of Health are implemented; the private sector includes for and not-for-profit providers and faith-based providers under the co-ordination of the Churches Health Association of Zambia (CHAZ). The country also has traditional and alternative health service providers which operate informally and are neither regulated nor formally monitored by the Ministry of Health.

The healthcare delivery system is based on five levels of care. At the apex of facility types are the level three hospitals which offer specialist services and are the highest level of reference in the country. They cater for a population of 800,000 and above and have specialist services in internal medicine, surgery, paediatrics, obstetrics, gynaecology, intensive care, psychiatry, training and research. There were six-third level hospitals in the country in 2012 (GRZ, 2013).

Second level hospitals, also known as provincial or general level hospitals cater for a catchment area of between 200,000 and 800,000 people. They provide services in internal medicine, general surgery, paediatrics, obstetrics, gynaecology, dental, psychiatry and intensive care services. In 2012, there were nineteen second level hospitals in the country.
First level hospitals, also known as district hospitals serve a catchment population of between 80,000 and 200,000 people. Services provided include medical, surgical, obstetric and diagnostic services and they are also referrals for health centres. There were eighty-four first level hospitals in the country in 2012.

Health centres are broadly classified as either rural or urban. Urban health centres (UHCs) or clinics serve a catchment population of between 30,000 and 50,000 people while rural health centres (RHCs) typically target about 10,000 people. There were 409 urban health centres and 1,131 rural health centres in 2012.

Health posts are built for communities that are far away from health centres. They serve a catchment population of about 3,500 in rural areas and 1,000 to 7,000 in the urban areas. They are set up within a radius of 5km for sparsely populated areas. There were 307 health posts in the country in 2012. The healthcare services provided here are basic (GRZ, 2013).

The World Health Organisation reports that many Zambians use traditional medicine regardless of ethnic, religious or social background. Many of the traditional practitioners are not formally registered. The traditional healers’ practitioners association of Zambia with a membership of more than 35,000 is the association through which traditional practitioners obtain and renew their licenses although formal standards of recognising practitioners’ qualifications are yet to be effected. The government recognises traditional and complimentary and/or alternative medicines but they have not formally been integrated into the national health sector to be used with allopathic medicine. However, traditional birth attendants and community healthcare workers assist in the provision of primary healthcare (WHO, 2001).

The following figures quantitatively summarise the formal healthcare sector in Zambia by type and by level of care in Zambia in 2012.
Table 1: Number of Health Facilities by Level of Care

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Level 3</td>
<td>6</td>
</tr>
<tr>
<td>Level 2</td>
<td>19</td>
</tr>
<tr>
<td>Level 1</td>
<td>84</td>
</tr>
<tr>
<td>Urban Health Centre</td>
<td>409</td>
</tr>
<tr>
<td>Rural Health Centre</td>
<td>1131</td>
</tr>
<tr>
<td>Health Post</td>
<td>307</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1956</strong></td>
</tr>
</tbody>
</table>

*Source: GRZ: 2013*

Table 2: Number of Health Facilities by Type of Ownership

<table>
<thead>
<tr>
<th>Description</th>
<th>Number of Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Facility</td>
<td>1590</td>
</tr>
<tr>
<td>Mission Health Facility</td>
<td>116</td>
</tr>
<tr>
<td>Private Health Facility</td>
<td>250</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1956</strong></td>
</tr>
</tbody>
</table>

*Source: GRZ: 2013*

### 2.1. Malaria Interventions in Zambia

In the two decades to the year 2000 few interventions in the fight against malaria focused on prevention; the few existing policies were more concerned with the treatment of malaria rather than its prevention. These policies were largely unsuccessful; in 1976 there were 10.6 deaths per 1,000 malaria admissions, but by 1994 this had increased nearly five-fold to 51 deaths per 1,000 malaria admissions. The under five were particularly affected as malaria rates were 5 times higher amongst them than among those above the age of five. In order to reduce the malaria burden and meet key health targets such as the Roll Back Malaria (RBM) and the health related Millennium
Development Goals (MDGs), the government placed malaria control as a key goal and included it in the national development plans and the national health strategic plans (Chenda et al., 2013).

Key interventions that Zambia has adopted in the fight against malaria have included an integrated vector management programme, prevention of malaria in pregnancy, and malaria diagnosis and case management.

2.1.1 The Integrated Vector Management Programme (IVM)

Integrated Vector Management (IVM) may be defined as “a rational decision-making process for the optimal use of resources for vector control. It is based on five key elements that include evidence-based decision making, integrated approaches, and collaboration within the health sector and with other health sectors. It further includes advocacy, social mobilization, and legislation in addition to capacity building (Beier et al., 2008).”

The main interventions under this programme are the use of long lasting insecticide treated nets and the indoor residual spraying programme. Larval control measures are also part of the IVM programme, although this particular intervention has not been implemented on a large scale in Zambia.

2.1.1.1 The Long Lasting Insecticide Treated Nets (LLIN) Programme

Insecticide treated nets repel and provide a physical barrier against mosquitoes. They also have an insecticidal effect on mosquitoes. The use of LLINs provides one of the most cost effective means of malaria prevention.

In Zambia, programmes to mass distribute insecticide treated nets (ITNs) began in 1998 and initially targeted the vulnerable groups of women and children but have since been extended to target all sleeping spaces in all households. The major means of distribution have included mass distribution campaigns and distribution to pregnant women in antenatal care (ANC) clinics through the malaria in pregnancy ITN scheme. Other methods of distribution have included the equity programme that targets vulnerable groups (orphans, the aged, chronically ill), the community malaria boost programme, the malaria school health programme and the Churches Health Association of Zambia (CHAZ) malaria control programme; all of which distribute free bed nets. Bed nets are also sold commercially. Following a recommendation by the World Health
Organisation Pesticides Evaluation Scheme (WHOPES), several programmes only distribute LLINs since 2006 which has resolved the problem of having to re-treat nets every six months. The percentage of households owning at least one insecticide treated net has increased from 13.6 per cent in 2001 to 35 per cent in 2005 and 64 per cent in 2010 (NMSP, 2012).

2.1.1.2 Indoor Residual Spraying (IRS) Programme

Indoor residual spraying (IRS) involves the spraying of an effective dose of insecticide on indoor surfaces inside human dwellings, usually twice a year. IRS provides a cost effective means of malaria prevention in communities.

In Zambia, the IRS programme was introduced in 2003 by the Ministry of Health (MoH) on a trial basis in the five urban districts of Ndola, Kitwe, Kabwe, Lusaka and Livingstone. The policy was adopted following its successful use in selected areas by the Konkola Copper Mine in 2000. By 2010 the number of districts covered by the IRS programme increased to 54 with 85 per cent of the targeted homes successfully sprayed. The use of IRS takes into account many factors including approval by the WHO Pesticides Evaluation Scheme (WHOPES), in-country registration with the Zambia Environmental Management Agency (ZEMA), duration of effectiveness, conformity with environmental requirements and costs (NMSP, 2012).

Resistance has been traced in some vectors of anopheles mosquitoes, greatly varying between IRS and LLIN localities. The level of resistance has generally been higher in IRS areas. The IVM has largely focused on LLINs and IRS (Ibid, 2012).

Larval control involves the management of aquatic habitats that are potential habitats for mosquitoes. It involves targeting the immature/aquatic stages of the mosquito, thereby reducing the abundance of adult vectors. The use of larval control has largely been hindered by the vast spread of breeding sites that are hard to reach during the rainy season (WHO, 2013).

2.1.2 Prevention of Malaria in Pregnancy

Malaria infection during pregnancy poses a significant risk to the pregnant woman, her foetus and the new born child. The pregnant woman is particularly at risk of severe malaria and maternal anaemia while the foetus and/or unborn child are at risk of spontaneous abortion, still birth, premature birth and low birth weight. As part of the antenatal care (ANC) clinic, the malaria control programme has successfully been able to implement a Malaria in Pregnancy (MIP) policy.
These policies include the “provision of free intermittent preventive treatment during pregnancy (IPTp) with at least three doses of SP [sulfadoxine/pyrimethamine] during pregnancy, free ITNs; and free prompt diagnosis and treatment and treatment of clinical treatment (NMSP: 2012).”

2.1.3 Malaria Diagnosis and Case Management

In 2003 the Ministry of Health (MoH) adopted the use of artemisinin-based combination therapy (ACTs), using Coartem® as a frontline antimalarial medicine for all persons above 5kg except pregnant women in their first trimester. The treatment policy is that every confirmed case of malaria is treated with an ACT. Quinine is still used to treat severe malaria in both children and adults. The government has since 2008 sought to primarily use microscopy and rapid diagnostic tests (RDTs) to detect malaria cases but a number of cases are still only clinically assessed while only a portion are lab diagnosed (Ibid, 2012).

2.2 Financing of Malaria Programmes

User fees were introduced in the Zambian health sector in 1993 and exemptions were introduced for children below five years and the elderly as well as for victims of accidents and a few illnesses (tuberculosis and sexually transmitted infections) in 1995. In 2006, user fees were abolished at primary healthcare facilities in designated rural districts (Masiye et al., 2010). User fees were subsequently abolished in urban areas in 2011.

The government and donors are the biggest source of finance for healthcare expenditures accounting for 50 per cent and 40 per cent of total financing respectively in 2010. Households and employers constitute the other sources of finance; 6.8 per cent and 3.7 per cent respectively (NHA, 2010).

In 2010 the most important source of funds for the malaria programme was from central government revenue at 41 per cent while donors contributed 35 per cent. Households contributed 26 per cent whereas employers contributed only 4 per cent. The following table shows the sources of funds for the malaria programme:
Table 3: Distribution of National Malaria Real Expenditure by Source (K, billion) (1994=100)

<table>
<thead>
<tr>
<th>Sources of Malaria Funds by year (ZMK’ Bn) (Real , 1994=100)</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central government revenue</td>
<td>10.7</td>
<td>13.0</td>
<td>12.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Employer funds</td>
<td>1.2</td>
<td>1.5</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Household funds</td>
<td>9.3</td>
<td>6.1</td>
<td>5.7</td>
<td>5.9</td>
</tr>
<tr>
<td>Donors</td>
<td>10.3</td>
<td>9.7</td>
<td>17.6</td>
<td>11.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31.54</strong></td>
<td><strong>30.35</strong></td>
<td><strong>37.52</strong></td>
<td><strong>32.44</strong></td>
</tr>
</tbody>
</table>

Source: NHA (2010)

Curative care takes up nearly 49 per cent of the total malaria expenditure, being 35 per cent outpatient and 14 per cent inpatient curative care. This expenditure is followed by prevention whose average share between 2007 and 2010 was 13 per cent.

Table 4: Distribution of National Malaria Expenditure by Functions (%)

<table>
<thead>
<tr>
<th>Malaria Expenditure by Function by Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria-Inpatient Curative Care (%)</td>
<td>12.57</td>
<td>16.55</td>
<td>13.78</td>
<td>17.34</td>
</tr>
<tr>
<td>Malaria-Outpatient Curative Care (%)</td>
<td>39.20</td>
<td>30.95</td>
<td>23.87</td>
<td>28.85</td>
</tr>
<tr>
<td>Medical goods dispensed to outpatients (%)</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Prevention (%)</td>
<td>30.09</td>
<td>6.21</td>
<td>4.05</td>
<td>11.41</td>
</tr>
<tr>
<td>General administration of health (%)</td>
<td>11.49</td>
<td>13.64</td>
<td>8.93</td>
<td>9.56</td>
</tr>
<tr>
<td>Other health administration and insurance (%)</td>
<td>0.93</td>
<td>0.97</td>
<td>0.42</td>
<td>0.18</td>
</tr>
<tr>
<td>Capital formation-Malaria (%)</td>
<td>1.91</td>
<td>15.89</td>
<td>9.82</td>
<td>6.33</td>
</tr>
<tr>
<td>Education and training-Malaria (%)</td>
<td>1.44</td>
<td>4.45</td>
<td>29.55</td>
<td>5.52</td>
</tr>
<tr>
<td>Not Classified by Kind (%)</td>
<td>2.35</td>
<td>11.34</td>
<td>9.57</td>
<td>20.81</td>
</tr>
<tr>
<td><strong>Grand Total (ZMK ’Bn)</strong></td>
<td><strong>409.40</strong></td>
<td><strong>444.37</strong></td>
<td><strong>605.68</strong></td>
<td><strong>584.94</strong></td>
</tr>
</tbody>
</table>

Source: NHA (2010)
CHAPTER THREE

LITERATURE REVIEW

Globally, a number of empirical studies on health care seeking behaviour have been conducted with each adopting a different methodology. To ensure a meaningful comparability of results, this section begins with studies that considered health care seeking behaviour not limited to a particular disease and then proceeds to look at studies that particularly considered malaria illness. It then proceeds to review studies that considered determinants of out of pocket health care expenditures not limited to a particular disease before considering studies that were specific to malaria.

3.0. Non-Disease Specific Demand for Health Care Studies

A number of studies have investigated health care demand in developing countries. Yip et al. (1998) adopted a geographical approach in investigating the determinants of patient choice of medical provider in Shunyi County in Beijing, China using survey data from 1,877 users. The study revealed that individuals earning higher income had an increased probability of using higher level facilities and fully insured individuals also had a higher probability of visiting a higher level facility except in cases when insurance was limited to village based facilities, in which case patients opted for village level clinics rather than higher level facilities. Another finding of the study was that individuals with a chronic disease within the three months prior to the survey were twice as likely to visit a higher level facility as a village health post.

The finding on income (or more generally economic status) by Yip et al. (1998) is similar to that of Muriithi (2013) who found that wealth was a key determinant of health seeking behaviour and also had a study limited to a single geographical location; the study used multinomial logistic regressions to analyse data from various health facilities in and around Kibera slum located in central Nairobi, Kenya. Muriithi’s study did however depart from the China study by having a different focus. The covariates of specific interest to the study were information on health care quality and the quality variation conditioned on the given information. Service quality, information about this quality and waiting time increased the probability of visits to private and public clinics, relative to self-treatment. The author hypothesised a likely positive correlation between waiting time and unobservable aspects of quality in facilities with low cost of treatment such as public
clinics. User fees and gender were also found to be determinants of patient’s choice among alternative medical treatments. According to the author, the finding on gender supports the hypothesis that women are more sensitive to their health status since they were more likely to seek appropriate care than men.

Supply side factors can also be important determinants in an individual’s health seeking behaviour as demonstrated by Ngungi (1999) who considered the impact of supply side cost sharing policies on preference order in households and the subsequent impact on health seeking behaviour in Mwea Division, Kirinyaga District, Kenya. Similar to the study by Muriithi (2013) and Yip et al. (1998) income was found to be a significant determinant. The study recommended that user fees be accompanied by improved services, as individuals showed a willingness to pay higher charges for reduced waiting time or pay higher charges while waiting longer for an improved service quality. A greater prevalence of disease was associated with an increased tendency to use non-public facilities and a drop in the use of public facilities following the introduction of user fees was also noted. The results on user fees, waiting time and service quality were confirmed in Muriithi’s (2013) later study.

Caution is in order when attempting to draw inference from these findings as the studies were largely conducted using small samples and may therefore be representative of very similar environments only. For example, the study by Yip et al. (1998) had a sample size of 1,877 while Ngungi (1999) had 250 respondents whereas Muriithi (2013) incorporated data from six focus group discussions to construct an index on perceived quality of services and trust that the residents of Kibera had in the services available at health facilities. Whereas, these results may be representative of the areas of study, the respective samples may not be large enough to extend these findings to a national level.

Other researchers have used larger samples to ensure more robust and nationally representative results. A study by Lawson (2004) ran multinomial logistic regressions across three age samples categorised as adult, school and pre-school children with each category analysed by gender. Unlike the aforementioned studies, this used a more robust data set from the Uganda National Household Survey (UNHS) to investigate the main determinants associated with seeking private, government or pharmacy based health care for both adults and children. Distance travelled to a health facility was found to be a significant factor across all the categories while increased health care demand
was found to be strongly correlated with income across all age groups most especially in women; the only category for which the presence of user fees was significant in reducing the probability of seeking health care. It was also found that as men age, they have an increased usage of private care while women generally used government facilities more often, the author did not provide any possible explanation for this observation. Increased levels of education for both men and women were associated with reduced usage of governmental healthcare, suggesting that government healthcare facilities are perceived to be of a lower quality.

Amongst nationally representative health care seeking behaviour studies conducted in Zambia, Hjotsberg (2003) provides the only journal published work. Her study considered factors other than health status that influence the decision by individuals to seek health care as well as the factors that determine the magnitude of health care expenditure in Zambia. Like Lawson (2004), the study used a fairly large sample in the Living Conditions Monitoring Survey (LCMS) of 1998 and similarly used a multinomial logistic regression for analysis. Amongst the findings of the study were that individuals of higher economic status (as measured by household consumption) are more likely to seek care and individuals who received regular income from employment were also more likely to seek care than those who did not whereas living in a rural area had a negative impact on the decision to seek care.

The significance of economic status is confirmed by Yip et al. (1998), Muriithi (2013) and Lawson (2004). Education was found to affect utilisation but gender was neither a determinant of the decision to seek care nor a determinant of the amount of expenditure on health care. Hjortsberg’s finding that gender does not significantly influence health care choice contrasts that of Lawson (2004) and Muriithi (2013), although Muriithi’s study was confined to a slum in Nairobi.

3.1. Studies Specific to Malaria Health Care Seeking Patterns

All of the aforementioned studies considered health seeking behaviour for multiple diseases and were not particular to a specific disease. However, policy may be better informed when studies are focused on a particular disease as the demand for treatment may vary for the same individual when they are faced with different illnesses (Mackian, 2003).

In a study among the Wa ethnic minority in Myanmar, Xu et al. (2012) surveyed 718 households (with a total of 3,678 people living in them). Multivariate logistic regression analysis revealed five
variables that were independently associated with delayed malaria treatment. Income was significant, because families with an average annual income per person of more than $200 were more likely to seek treatment within 24 hours. Distance was another factor as households located more than 3km from a health facility were less likely to seek early treatment. Additionally, families where women made decisions were more likely to seek early treatment while families were more likely to seek prompt treatment if the patient were male and for children under the age of 15 years old.

The findings of Xu et al. (2012) suggest that males were preferred to females as household members among the Wa ethnic minority and it was also revealed that the household played a role in treatment seeking behaviour and the decision to seek treatment was not made by the individual alone. The finding on the influence of gender contradicted that of Franckel and Lalou (2009) who reported that a child’s gender and educational level of their parents were not significant determinants of a prompt visit to a health facility in rural Senegal. The two studies further diverged in their findings as Franckel and Lalou (2009) reported that economic status of the household as measured by their goods and equipment did not seem to be a significant factor and that visits to the health centre appeared more frequent in households where the father was the only decision maker. The two authors studied 902 households with at least one child affected by fever. Using a backward stepwise binary logistic regression, the researchers were interested in understanding health-seeking behaviour for childhood malaria in rural Senegal with the dependent variable modelled as the probability of visiting a health facility within 48 hours after the beginning of first symptoms. The studies did however converge on two things as distance to the facility had a strong influence on the probability of consulting a health centre and that family composition, especially the presence of the child’s paternal uncle and grandmother in the household significantly influenced the probability of consulting the health centre quickly.

Two independent studies conducted in Ghana give credence to the reporting’s of Xu et al. (2012) over Franckel and Lalou (2009) regarding the influence of gender on treatment seeking behaviour. Dzator and Asafu-Adjaye (2004) considered the factors that influence malaria seeking behaviour in Ghana using a multinomial logistic regression on a sample of 231 malaria cases to model malaria care seeking behaviour while Nonvignon et al (2010) considered treatment choices for under five febrile children in a rural Ghanaian district using a multinomial probit model to analyse data
covering care givers of 529 febrile under five children. Dzator and Asafu-Adjaye (2004) report that females in rural areas had a higher probability of seeking care at a public provider while Novignon et al. (2010) suggest gender disparity in choice of treatment as female under five children largely used self-care while males used public providers. Similar to the results of Xu et al. (2012) the latter study reports that income was a significant factor as caregivers with higher incomes were more likely to use public and private providers over self-medication while caregivers with insurance had a higher probability of seeking public care rather than over the counter or private providers.

Caution is in order when drawing comparisons between the two studies from Ghana since Dzator and Asafu-Adjaye (2004) considered an urban and rural area in their study while categorising alternative treatments as self-care, traditional medicine, consultations at drug stores, and formal (western) malaria care. Whereas Nonvignon et al. (2010) only considered a rural part of Ghana and the care options considered were self-medication, over-the-counter providers, public providers and private providers. Other findings by Dzator and Asafu-Adjaye (2004) were that higher levels of education of the household head increased the probability of seeking treatment at a private health provider compared to self-medication while households with more children were more likely to choose a private provider over a public provider and to choose self-care over a public provider. Treatment costs had a negative impact on the probability of seeking care, while waiting time was found to be statistically insignificant. Travel time was found to be have a statistically negative effect on the probability of seeking care in the entire sample and the urban area but was insignificant in the rural areas. The results also demonstrated that the demand for malaria is generally inelastic vis-à-vis time and treatment costs. Nonvignon et al. (2010) further revealed that longer travel, waiting and treatment times increased the probability of using self-medication and over the counter providers rather than public and private providers. Their results suggest that higher treatment charges and longer times at public facilities encouraged care givers to opt for private providers.

3.2. The Determinants of Out-of-Pocket (OOP) Health Care Expenditures

Several studies have considered the determinants of health care expenditures as an extension of health seeking behaviour studies. Su et al. (2006) sought to identify determinants of illness reporting, provider choice and resulting expenditure using a sample of 800 households in Nouna
health district, Burkina Faso during 2000-2001. The results suggested an age bias in the intra-household allocation of resources as adult household members reported illness more often and had higher expenditure relative to children. The author hypothesised that this could perhaps explain the very high child mortality rates in Burkina Faso. On the other hand, females were more likely to report illness and individuals living in female headed households were more likely to report illness and incur higher expenditures whereas economic status (as measured by household expenditure) and the literacy of the household head were determinants of the amount of expenditure for western institutional care. The study revealed that individuals spent more on infectious diseases, injury and other disease categories compared to malaria, a category for which many opted for “self-care” or “no-care” alternatives.

The finding by Su et al. (2006) that being a child is associated with lower expenditure somewhat contradicts the earlier finding by Hjortsberg (2003) in Zambia who reported that being female and below the age of six positively influences health care expenditures. The findings of the two studies further departed on the reported influence of gender; whereas Su et al. (2006) found being female to be associated with higher health care expenditures, Hjortsberg (2003) reported that being female influenced expenditures on health care negatively. The two studies did however converge on the finding that higher income or economic status is associated with higher expenditures and Hjortsberg’s (2003) earlier work similarly found that individuals seeking professional care at a health facility and were suffering from a headache or unspecified disease increased their health care expenditure as compared to when the individual had malaria. Hjortsberg’s (2003) other findings were that education of household head and having made more than one visit to a health facility are positively associated with health care expenditures whilst having an insurance plan or being exempted had a negative influence on the magnitude of health care expenditures incurred at health facilities. Living in a rural area was not only associated with lower expenditures for individuals seeking professional health care but also those opting for self-medication whereas possessing a motor bike was found to be positively related with health expenditures.

The foregoing studies on the determinants of health care expenditures considered the determinants of health care expenditures for several diseases. Orem et al. (2013) sought to assess the patterns of treatment seeking behaviour for children below the age of five with malaria and to study the statistical relationship between out of pocket expenditure (OOP) on malaria treatment using a
sample from the Uganda Malaria Indicator Survey. The study first used a binomial logit to establish the determinants of whether some OOP is incurred or not and a log-linear regression to establish the determinants of OOP on malaria treatment. The study found the difference between poor and rich socio-economic groups to be significant. Contrary to the finding of Hjortsberg (2003), there was no significant difference between the rural and urban households vis-à-vis health care expenditure. Furthermore, being hospitalised was the most expensive form of treatment while there was a significant difference in expenditures between various geographical regions. It was also found that children whose mothers had a higher level of education were more likely to incur OOP expenditure.

Adopting a similar method to Orem et al. (2013), Moses (2014) used the Heckman selection two-step model to investigate the determinants of out of pocket expenditure in the South-South geopolitical zone of Nigeria. The study concluded that the state of residence, age of the household head, family size, per capita consumption and adult equivalent weight together determine whether a person who falls sick will spend OOP or not. On the other hand; age, age squared, household size, household size squared and per capita consumption expenditure (a proxy measure of per capita income) determined how much an individual spent on health care.

In another study, Brinda et al. (2014) investigated the factors affecting out of pocket health expenditures among the adult and elderly population in Tanzania using a nationally representative study. The study revealed that increasing age, being female, obesity, and functional disability increased the out of pocket expenditure incurred by adults significantly whereas functional disability and visit to traditional healers increased the OOP health expenditure in older participants. Moreover, adult participants who lacked formal education or worked as manual labourers earned significantly less and spent less on health, despite having higher levels of disability.

**Summary of the Literature**

The literature above identifies that the logistic regression model is overwhelmingly used in analysing the determinants of the decision to seek treatment or not whereas the multinomial logistic regression is frequently used in analysing the choice among care option alternatives. There is however no uniformity on the characterization of various treatment options or the reference
category; for example, whereas some researchers have considered self-medication as not seeking treatment, many others have considered it as an alternative treatment option.

On the whole, the literature supports that income/economic status, insurance, user fees/price and distance significantly influence health seeking behaviour and subsequent health care expenditures. A higher economic status and being insured increase the probability of seeking treatment as they reflect an increased ability to pay for appropriate treatment services, while user fees/price have a negative influence on the probability of seeking treatment since they increase the cost of seeking treatment. There are however mixed findings on the influence of age, education, gender and region of residence on both the care option sought and the magnitude of health care expenditures incurred.

In formulating appropriate malaria policies, the findings from other studies needs to be contextualized as the endemicity of malaria across countries needs to be considered. As indicated in the introduction, 98 per cent of malaria cases in Zambia are due to plasmodium falciparum (the world’s deadliest vector), other counties may have less deadly vectors of malaria. In addition, malaria is prevalent in nearly all parts of Zambia whereas it may be confined geographically in some of the countries considered in the literature. These factors may influence health seeking behaviour and subsequent health care expenditures. It is worthy of note that many of the current global anti-malaria strategies have been instituted after the year 2000 globally and countries may have been at different levels of implementing these programmes at the time of the various studies and we may therefore not be able to make appropriate extensions of their findings to Zambia.

Our review of the literature highlights that only a few studies have considered malaria health care seeking behaviour and out of pocket expenditures and there are even fewer studies that have considered this subject in the context of the abolition of user fees. Furthermore, the evidence on several variables including age, education, gender and region of residence is inconclusive and several studies do not provide hypotheses as to how variables used in their studies influence health care seeking patterns or the magnitude of health care expenditures.

From the foregoing, it is evident that there is a gap in our understanding of the factors that currently affect the demand for malaria treatment and the financial burden imposed by malaria sickness on individuals and households in Zambia.
CHAPTER FOUR

METHODOLOGY

4.0. Conceptual Framework of the Demand for Malaria Treatment

The conceptual foundation of this study is based on Grossman’s 1972 seminal paper on the demand for health and health care services. The Grossman model is an extension of the Human Capital Model in which individuals invest in their health for purposes of boosting their productive capacity. Seeking malaria treatment services is considered a demand for health care. Underlying the Grossman model is the assumption that the individual derives utility from consumption goods \((X)\) and from good health \((H)\). The individual’s utility function may therefore be represented as:

\[
U = U (X, H)
\]

The model further assumes that the health stock can be augmented by the individual through medical treatment services \((M)\) and by committing time to prevention efforts \((t^I)\). Malaria treatment represents a form of consumption of \(M\) aimed at restoring health, \(H\). That is, the individual invests in \(H\) through \(M\) and \(t^I\). The health stock investment function is shown as:

\[
H = H (M, t^I)
\]

An improvement of the health stock is desired for its intrinsic value since more healthy time yields utility to the individual in itself. Additionally, an improved stock of health can also be valued as a capital good since it enables an individual to earn more income and thereby purchase more consumption goods, from which he/she derives utility.

Since the individual can influence their stock of health, the rational individual will demand an optimal stock of health that maximizes their lifetime utility. Grossman (1972) used techniques of dynamic optimization to consider the demand for health and health care services as part of a lifetime utility maximization problem faced by the individual.

For simplicity, this study adopts an analysis of the Grossman model by Zweifel et al. (1997) and applies it to the analysis of the demand for malaria treatment services in Zambia. We consider an individual whose planning horizon is two time periods. During each of the time periods, the individual may experience an amount of time in which they suffer from malaria illness \((t^*)\), which
is lowered with a larger stock of health \((H)\). We also assume that the individual derives utility from consumption goods \((X)\) but derives disutility from time sick. From the assumptions, the utility function may be represented as:

\[
U = U(t^s(H_0), X_0) + \beta U(t^s(H_1), X_1) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 1.6.1
\]

Where \(\beta\) represents a subjective discounting factor.

The Grossman model regards the individual as a producer of health and an essential equation of the model describes the movement of the health stock over time. We assume that the health stock depreciates at a rate \(\delta\) over time due to ageing and malaria illness. The individual can make investments \((I)\) in his health stock through the utilisation of malaria treatment services or committing time to preventive efforts \((t^I)\). The time committed to preventive effort may be through individuals acquiring increased malaria knowledge, correctly utilising a long lasting insecticide treated net, and subscribing to Indoor Residual Spraying (IRS) in their place of residence.

The health stock in the next period \((H_1)\) depends on the stock of health today adjusted for depreciation and investment made in the health stock in the current period. This is summarized in the following equation:

\[
H_1 = H_0(1 - \delta) + I(M_0, t^I) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 1.6.2
\]

The final fundamental equation is based on the assumption that out-of-pocket expenditures associated with seeking malaria treatment services \((pM)\) and expenditures on consumption goods \((cX)\) are financed by wage income \((W)\) and some initial endowment of wealth \((A_0)\). It is also assumed that wage income \((W)\) diminishes proportionately with the period of time that the individual suffers from malaria illness or dedicates to malaria prevention efforts. We further assume that the investment in health is only made in period 1. The budget constraint facing the individual can therefore be represented as:

\[
A_0 + w_0(1 - t^s(H_0) - t^I) + \frac{w_1\left(1 - t^s_1(H_1)\right)}{R} = pM + cX_0 + \frac{cX_1}{R} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 1.6.3
\]

Where \(R\) represents a factor that discounts future period money values.
The individual faces a utility maximisation problem in which he or she seeks to maximise his or her lifetime utility subject to the health stock constraint and the budget constraint. This utility maximisation problem can be considered using the following Langrangian set up:

\[ L(H_1, t^1, M, X_0, X_1) = U[t^s(H_0), X_0] + \beta U[t^s(H_1), X_1] + \mu[H_0(1 - \delta) + I(M, t^1) - H_1] + \lambda \left[ A_0 + w_0(1 - t^s(H_0) - t^1) + \frac{w_1(1 - t^s(H_1))}{R} - pM - cX_0 - \frac{cX_1}{R} \right] \]

From Grossman’s solution to this problem, we adapt a generic structural demand function for medical treatment services specified in log form as:

\[ \ln M = \ln H + (1 - \alpha) \ln W - (1 - \alpha) \ln P - \beta E \]

Where all the variables are as defined before i.e.

M = Malaria treatment services utilized

H = The individual’s health stock

W = Wage rate

P = Price of health care services

E = Education

Education \((E)\) acts as a shift factor and magnifies the effects of malaria treatment services utilised \((M)\) whereas \(\alpha\) is a parameter which measures the elasticity of production of malaria treatment services. \(\beta\) is the marginal productivity of education.

**Predictions of the Model**

The model specifically predicts wages, age, price of treatment services and education to be important determinants of the demand for malaria treatment services.

The model posits a positive relationship between wages and the demand for malaria treatment since wealthier individuals have a higher opportunity cost in the form of lost earnings when they fall ill and they are therefore predicted to, ceteris paribus, be more likely to demand malaria treatment.
A higher price of malaria treatment services is, ceteris paribus, associated with a reduced demand for malaria treatment services since it raises the marginal cost of seeking treatment. Additionally, an increased level of education makes the individual a more efficient producer of health and it is therefore expected that a more educated individual is likelier to use fewer malaria treatment services to attain a given state of health, given that the individuals have the same initial health stock.

Increased age on the other hand reduces the efficiency of converting health investments into health stock to the extent that it depreciates the health stock. Age is therefore predicted to be positively associated with the demand for malaria treatment services.

In addition to the variables expressed in the model, this study included variables that have been considered by the empirical literature.

The predictions of the Grossman model on education and age have been the subject of empirical controversy. For example, contrasting the predictions of the Grossman model, education has been found to be positively related with the demand for health whereas several empirical studies have reported contrasting evidence on age. Our review of the empirical literature in chapter three of this study provides further insight on the evidence of some of the variables considered by Grossman.

4.1. Data
The study used data from the 2013 Zambia Household Health Expenditure and Utilisation Survey (ZAHHEUS). This survey data was selected because it provided the most recent data on utilisation of health care services and health care expenditures associated with seeking treatment in addition to providing recent, reliable and nationally representative demographic and socio-economic statistics of the Zambian population. The sampling design of the survey considered all households in Zambia and 12,000 households were eventually sampled based on the sampling frame from the 2010 nationwide census. The Kish square root allocation method was used to allocate the sample as it provides a compromise between the equal and proportional allocation methods which accommodated the variability in terms of size among the strata and ensured that large and small strata had a fair representation. Stratification of the sample was by province and sub-stratification was by rural/urban region or residence. A two-stage stratified cluster sample design was used. In the first stage, Standard Enumeration Areas (SEAs) were selected within each stratum using the
Probability Proportional to Estimated Size (PPES) procedure and during the second stage, twenty households were selected from each SEA using the systematic random sampling method. Data was analysed using the STATA 13 software package.

4.2. Study Variables

4.2.1. The Dependent Variables
This study considered two models and therefore had a dependent variable for each model. The dependent variable in the health care seeking model was care option. The care options were described by the possible action that the individual could have taken at the onset of malaria symptoms i.e. the option of seeking professional care, self-medication or doing nothing.

The dependent variable in the health care expenditure model was the total amount of out-of-pocket expenditures incurred in seeking malaria treatment. The total expenditures were comprised of costs incurred on consultations at the health facility; drugs/herbs at the health facility or elsewhere; medical investigations at the health facility or elsewhere; transportation costs to and from the facility or any other place where treatment was sought, and any other costs that were incurred in seeking malaria treatment.

4.2.2. The Independent Variables
The independent variables were drawn from the theoretical and empirical literature that has been considered.

Region of Residence
A dummy was used to capture the region of residence classified as 1 if the household was in a rural area and 2 if the household was in an urban area. It was a priori expected that people in rural areas may have a lower probability of seeking professional treatment and therefore incur lower expenditures due to difficulties in accessing professional care services. As highlighted in the literature, evidence to the contrary has however been reported in other countries.

Gender of the Ill Individual
Gender was categorised using a dummy variable coded as 1 if the ill individual was male and 2 if the ill individual was female. The evidence of gender’s influence on both of the dependent variables is however inconclusive as observed in the literature review.
**Age of Ill Individual**

Age was measured as a continuous variable. The study sought to establish whether treatment seeking behaviour was the same as people grew older. The Grossman model predicts a faster rate of depreciation of the health stock as individual’s age and this is likely to imply a positive relationship between the demand for malaria treatment and age. The empirical literature generally reports age to be significant but there are mixed findings on the sign of its coefficient.

**Per Capita Consumption Expenditure of Household**

This was a proxy measure for income and it was computed by dividing the total amount of household monthly consumption expenditure by the number of household members. A priori, we expected a positive impact on both dependent variables following from our empirical and theoretical literature reviews.

**Education of Household Head**

Education of the household head was considered as a categorical variable coded as 1 if the head had no formal education, 2 if the head had primary education, 3 if the head had secondary education, and 4 if the head had tertiary education. It was a priori expected to have a positive influence on the dependent variables since more educated heads may be more likely to recognise malaria symptoms and seek treatment from qualified providers which may thus raise expenditures associated with malaria treatment. The empirical evidence on the influence of education is however mixed.

**4.3. Empirical model and Estimation**

Following Grossman and the general empirical health demand literature, this study estimated two models. The first is a multinomial logistic regression that models health care choice as a function of individual and household explanatory variables. In the second model, we ran a generalised linear model of the magnitude of health care spending as a function of a similar set of explanatory variables.

**4.3.1. The Health Care Behaviour Seeking Model**

Given that in the health seeking behaviour model the outcome of interest was defined as three levels (seek formal treatment, opt to self-medicate or do nothing) a multinomial logistic (MNL)
A regression model was specified to determine the factors that influence the likelihood of an individual’s choice following an illness with malaria.

The empirical model was stated as:

\[ Y_{ij} = \beta X_i + \varepsilon_{ij} \]

Where \( Y_{ij} \) indicates the choice by individual “\( i \)” of treatment option “\( j \)”. The treatment options were classified as 1 if the individual sought formal care, 2 if the individual self-medicated and 3 if the individual did nothing.

\( X_i \) represents a vector of covariates for individual “\( i \)”. The vector of covariates is fully specified as:

\[ X_i = \begin{cases} 
\text{Region of residence} & X_1 \\
\text{Gender of ill individual} & X_2 \\
\text{Age of ill individual} & X_3 \\
\text{Per capita total household monthly expenditure} & X_4 \\
\text{Education of Household Head} & X_5 
\end{cases} \]

\( \varepsilon_{ij} \) is the error term which was assumed to have a logistic distribution.

Analytically, the multinomial probability of option \( j \) conditional on \( X \) is given as:

\[
Prob \left( Y_i = j | x_i \right) = \frac{e^{\beta_j' x_i}}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}} \quad \text{for } j = 1, 2, \ldots, J \; \beta_0 = 0
\]

Where \( Prob \left( Y_i = j | x_i \right) \) indicates the probability of individual “\( i \)” choosing the treatment option “\( j \)”; \( j = 1, 2, \) or 3 \( \{ j = 1 \text{ if the individual sought professional care, } j = 2 \text{ if the individual self-medicated, and } j = 3 \text{ if individual did not seek care} \} \). \( X \) represents a vector of individual, household and regional characteristics. The option of professional care provided the base or reference category.

### 4.3.2. Determinants of Out-of-pocket Expenditure Model

The second model looked to establish the determinants of expenditures associated with seeking malaria treatment from the formal health care sector for outpatients. The expenditures associated
with self-medication were not investigated as this expenditure was not collected by the survey instrument. A preliminary analysis of the survey data showed that only a negligible proportion of individuals with malaria symptoms accessed in-patient treatment services and the study therefore considered expenditures incurred by out-patients only. Caution is therefore in order in extending the results of the health care expenditure model to the analysis of in-patient expenditures.

We used the following empirical model:

\[ E = E (X, P, Z) \]

Where:

E = Expenditure incurred in seeking malaria treatment, in Kwacha

X = Vector of covariates as defined in the first model

P = Type of provider visited

Z = Distance travelled in seeking care

**Choice of estimator**

Data on health expenditure is often characterised by a significant number of zero expenditures. The following table shows the proportion of out-patients who incurred any expenditure in seeking professional care.

**Table 5: Proportion of Out-patients Incurring OOP Expenditure**

<table>
<thead>
<tr>
<th></th>
<th>Incurred zero expenditure</th>
<th>Incurred positive expenditure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,884</td>
<td>1,206</td>
<td>4,090</td>
</tr>
<tr>
<td><strong>Incurred zero expenditure</strong></td>
<td>70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Incurred positive expenditure</strong></td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Our expenditure variable demonstrably has a lot of zero cases. Given this, the OLS estimator will yield biased estimates. The observance of many zeroes in the data is attributable to the abolishing of user fees in the provision of health care services at public primary level healthcare facilities.
Jones (2000) suggests three models for dealing with such zeroes: the selectivity, hurdle and two part models.

Selectivity models such as the Heckman model have been used where the zeroes represent non observable responses. The Heckman model has for example been popularly used in estimating the returns to schooling on the wage rate to tackle the practical problem that arises from the fact that some individuals who have received schooling do not work. In such instances, the use of simple OLS regression of wages on years of schooling will yield downward-biased estimates (Puhani, 2000). The reported zeroes are however genuine zeroes in the case of expenditures and we therefore opted not to use the Heckman model.

The hurdle model, on the other hand, is an improvement of the standard tobit model which assumes that a single model determines the choice between $y = 0$ as opposed to $y > 0$ and the amount of $Y$ given that $y > 0$. The hurdle models allow the initial decision of $y > 0$ as opposed to $y = 0$ to be separate from the decision of how much $Y$ given that $y > 0$ (Wooldridge, 2002). The level of expenditure is often not a voluntary decision made by the individual in seeking malaria treatment. Costs incurred are not the decision being made but are incidental to the process of seeking treatment. We therefore opted not to adopt the hurdle model for this study.

Other models considered were single-equation models such as generalised least squares (GLS) and transforming variables through logarithms and Box-Cox transformations. Mihaylova et al. (2011) provide a comprehensive summary of the literature on statistical methods for analysing health care resources and costs and report that “two-part models are shown to perform better than single-equation models in terms of split sample mean-squared forecast error as they accommodate heterogeneity between users and non-users as well as heterogeneity across users based on level of use (Duan, 1983), but mixture models are suggested to be more appropriate if distinct population groups contribute to different patterns of use (Deb and Holmes, 2000). Also, when transformation of data is employed, the need for back transformation to the original scale emerges and is exacerbated in the case of two-part models due to added conditionality.”

Following our consideration of the literature, we settled on using a two part model to analyse health care expenditures associated with seeking malaria treatment. This model can be considered in two parts; the first part considers the full sample and models the probability of expenditure being
incurred while the second part models the actual level of expenditure conditional on some expenditure having been incurred.

The conditional expectation of expenditures is therefore modelled as:

\[
E(c_i|x) = P(c_i > 0) E(c_i|c_i > 0)
\]

Where

\[ C_i = \text{Amount of expenditure incurred by individual “i” on malaria treatment and } X = \text{Vector of covariates.} \]

Analytically, the first component of the two part model can be considered using the logistic regression model due to its binary categorization i.e. whether expenditure was incurred or not. The level of expenditure can, on the other hand, be modelled using a generalised linear model (GLM) or ordinary least squares (OLS) model.

The GLM was selected over OLS in the second part to avoid estimator bias that may result in the presence of heteroscedasticity and inappropriate re-transformation of the data as suggested by Manning and Mullahy (2001).

As an initial guide to our analysis, we considered the GLM framework adopted by Manning and Mullahy (2001) in which the central structure of the model is an exponential conditional mean (ECM) or log link relationship specified as:

\[
\ln(E(y|x)) = x\beta \quad \text{or} \quad E(y|x) = \exp(x\beta) = x\beta = \mu(x; \beta)
\]

In utilising the GLM, it is necessary to specify a mean and variance function for the dependent variable conditional on the distribution function. The relationship between the mean and variance can generally be specified as \( \text{var}(y|x) = \sigma^2 \nu(x) \). The possible mean-variance relationships that may be considered include the gamma, poisson, Gaussian, negative binomial or inverse Gaussian distributions.

Several cost analysis studies adopting the GLM with a log link function have used the gamma distribution including Duan (1983), Barber and Thompson (2004), Blough et al. (1999), Manning and Mullahy (2001) whereas the high initial peak and the right tail of the inverse Gaussian
distribution have made it the distribution of choice in other studies ((Chikara and Folks, 1989); Moran (2004)).

The best fitting model was determined by considering the model with the lowest Akaike Information Criteria (AIC) as guided by Gujarati (2004).

The study acknowledges the potential limitations of the two part model in the case where the error terms in the two regressions are correlated as may be the case if an important variable influencing both regressions is omitted. There is however no direct method for testing for the independence of the error terms and there is no concordance on the indirect techniques (Bushway et al., 2007).

4.4. Diagnostic Tests
Diagnostic tests were run on the data to ensure precise and meaningful estimation of our models. Specifically, it was ensured that the models were correctly specified, there was no heteroscedacity, there were no influential data points (outliers) and there was no serious multi-collinearity.

4.4.1. Model Specification

The Wald Test
The Wald statistic was used to ensure that the model was correctly specified. The low probability value of the Wald statistic in both models indicates that the model cannot be improved by dropping any of the variables and the variables are therefore jointly significant.

Table 6: Results of the Wald Test

<table>
<thead>
<tr>
<th>Model</th>
<th>Wald Chi2</th>
<th>Prob &gt; Chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care seeking behaviour</td>
<td>127.20</td>
<td>0.0000</td>
</tr>
<tr>
<td>Health care expenditure</td>
<td>248.05</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

The Independence from Irrelevant Alternatives (IIA) Assumption Test

A limitation of the MNL is the potential violation of the IIA assumption. We also tested for the Independence from Irrelevant Alternatives (IIA) assumption in our multinomial logit model. Following from the assumption that the disturbances are independent and homoscedastic, a key
assumption of the multinomial logit model is that the odds ratios are independent of the other alternatives (Greene, 2000). A test first proposed by Hausman and McFadden (1984) was used to test that the care option categories were correctly specified. The principle of the test is that if we run a model with all three care option categories specified and run another model with the one category omitted, the parameter estimates will not change systematically. We adjusted for clustering by using a cluster adjusted sandwich estimator of variance. The clusters were as identified in the data set used. The final result of STATAs suest test for the IIA assumption is reproduced below:

\[
\text{chi2 (8)} = 7.52
\]

\[
\text{Prob } > \text{ chi2} = 0.4814
\]

Our results indicate that the care option, as used in our model is correctly specified, as we fail to reject the hypothesis that the model is correctly specified.

The Akaike Information Criterion (AIC)

One of the relevant tests for model fit is the AIC. In the two part model used to establish the determinants of health care expenditure, we used the Akaike Information Criterion (AIC) to select the best distribution function. We selected the log-link combination with the lowest AIC.

Table 7: Results of the AIC

<table>
<thead>
<tr>
<th>Family</th>
<th>Link</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma</td>
<td>Log</td>
<td>8.04</td>
</tr>
<tr>
<td>Poisson</td>
<td>Log</td>
<td>56.78</td>
</tr>
<tr>
<td>Gaussian</td>
<td>Log</td>
<td>11.14</td>
</tr>
<tr>
<td>Negative binomial</td>
<td>Log</td>
<td>8.10</td>
</tr>
<tr>
<td>Inverse gaussian</td>
<td>Log</td>
<td>8.12</td>
</tr>
</tbody>
</table>

Based on the AIC computation, the log link and gamma distribution provided the best fitting two part model and we therefore settled on this link and distribution.
4.4.2. Normality
Evidently, the dependent variable (out of pocket total expenditures) in the two part model is not normally distributed and OLS could therefore not be used for analysis. As discussed, we considered various options put forward by the literature on the subject and settled on a two part model to deal with the problem of non-normality in the health expenditure model.

4.4.3. Heteroscedasticity
The study adopted the Huber-White standard errors to control for potential heteroscedasticity in both of the models used in the study. The significant advantage of using these robust standard errors is that they are asymptotically valid in the presence of many forms of heteroscedasticity (Wooldridge: 2002, 57).

4.4.4. Outlier Test
STATAs bacon programme was used to identify outliers in the expenditure model. The bacon test is based on the Blocked Adaptive Computationally Efficient Outlier Nominators (BACON) algorithm proposed by Billor, Hadi and Velleren (2000). This command identifies a similar set of outliers but is computationally faster than another STATA outlier test, hadimvo (Weber, 2010). It is not always clear how to treat outliers and it may be left to the consideration of the researcher ((Ord, 1996), (Gujarati, 2004), and Greene (2004)). It was opted to drop eight identified outliers as they were significantly above normal expenditures and they could lead to spurious results.

4.4.5. Multicollinearity
From the literature and the nature of the data, there was no a priori reason to suspect multicollinearity to be a serious problem but we nonetheless obtained a pairwise correlation matrix. A pairwise correlation coefficient of 0.80 was considered a benchmark indicator of possibly high multicollinearity. The correlation matrix obtained, as shown in the attached appendix, does not reveal serious levels of pairwise correlation amongst the variables and multicollinearity was therefore not a serious problem in our models.
A mean value of 1.6 for the variance-inflating factor (VIF) similarly suggests low levels of multicollinearity. This is significantly below the threshold of 10, beyond which multicollinearity may be considered a serious problem (Gujarati, 2004: 362).
CHAPTER FIVE

RESULTS AND DISCUSSION

5.0. RESULTS

5.0.1. Descriptive Statistics

The data indicates that 22 per cent of respondents reported being ill in the four weeks prior to the nationally representative 2013 Zambia Household Health Expenditure and Utilisation Survey and 45 per cent of all ill respondents reported to have suffered malaria symptoms. The statistic on malaria incidence in Zambia is in line with other estimates such as that of the World Health Organisation, which reports that malaria accounts for 40 per cent of outpatient attendance in Zambia (WHO, 2012).

It was observed that 31 per cent of people reporting to have suffered malaria symptoms did not seek professional care. Further, 60 per cent of all individuals sampled in the survey resided in rural areas while 51 per cent were female. On the other hand, 69 per cent of individuals suffering malaria symptoms sought professional care, with 58 per cent of those seeking professional care having had visited a public health centre.

The average of total expenditures incurred in seeking malaria treatment among those who incurred some expenditure represents nearly 13 per cent of their per capita monthly household income.

The following table provides a summary of the descriptive statistics for the regional, socio-economic, treatment seeking behaviour and related expenditures for the sample.
Table 8: Descriptive Statics

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable description</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness prevalence (%)</td>
<td>% of correspondents reporting any illness in 4 weeks prior to survey</td>
<td>22.1</td>
</tr>
<tr>
<td>Prevalence of malaria among the ill (%)</td>
<td>% of respondents with malaria illness</td>
<td>45.3</td>
</tr>
<tr>
<td>Age in years</td>
<td>Mean (95% CI)</td>
<td>21.7 (21.6 21.8)</td>
</tr>
<tr>
<td>Gender of all individuals sampled (%)</td>
<td>Male</td>
<td>48.9</td>
</tr>
<tr>
<td>Education of entire sample (%)</td>
<td>No formal education</td>
<td>28.5</td>
</tr>
<tr>
<td></td>
<td>Primary education</td>
<td>43.58</td>
</tr>
<tr>
<td></td>
<td>Secondary education</td>
<td>23.85</td>
</tr>
<tr>
<td></td>
<td>Tertiary education</td>
<td>4.06</td>
</tr>
<tr>
<td>Region of residence (%)</td>
<td>Rural</td>
<td>60.24</td>
</tr>
<tr>
<td>Per capita household monthly expenditure, in Kwacha</td>
<td>Mean (95% CI)</td>
<td>214.5 (210.5 218.4)</td>
</tr>
<tr>
<td>Expenditure incurred in seeking malaria treatment, in Kwacha</td>
<td>Mean (95% CI)</td>
<td>26.9 (23.1 30.7)</td>
</tr>
<tr>
<td>Expenditure incurred in seeking treatment for other diseases, in Kwacha</td>
<td>Mean (95% CI)</td>
<td>46.6 (41.8 51.4)</td>
</tr>
<tr>
<td>Care options among individuals with malaria symptoms (%)</td>
<td>Sought professional care</td>
<td>68.9</td>
</tr>
<tr>
<td></td>
<td>Self-medicated</td>
<td>23.4</td>
</tr>
<tr>
<td></td>
<td>Did nothing</td>
<td>7.7</td>
</tr>
<tr>
<td>Provider type consulted by individuals reporting malaria symptoms (%)</td>
<td>Public health centre</td>
<td>57.9</td>
</tr>
<tr>
<td></td>
<td>Public health post</td>
<td>15.1</td>
</tr>
<tr>
<td></td>
<td>Public district/provincial/tertiary hospital</td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td>Mission hospital/Mission health centre</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>10.3</td>
</tr>
<tr>
<td>Distance travelled, in kilometres</td>
<td>Mean (95% CI)</td>
<td>6.05 (5.7 6.4)</td>
</tr>
</tbody>
</table>
5.0.2. The Health Care Seeking Behaviour Model

The health care seeking behaviour model classified the health care options facing an individual with malaria as the option to: seek professional care (the base category), self-medicate or do nothing. We found a number of demographic and socio-economic conditions to be significant determinants of the demand for malaria treatment services as summarised in the following table:

Table 9: Results of the Multinomial Logistic Regression for Health Care Seeking Behaviour

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>RRR Coefficients</th>
<th>95% Conf. Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care Option 1 (Professional health care): Base category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care Option 2 (self-medication)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Region (Rural =1; Urban = 2)</td>
<td>1.02</td>
<td>0.882</td>
</tr>
<tr>
<td>Gender (Male = 1; Female = 2)</td>
<td>0.84***</td>
<td>0.742</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>1.01***</td>
<td>1.003</td>
</tr>
<tr>
<td>Per capita monthly expenditure</td>
<td>0.99</td>
<td>0.999</td>
</tr>
<tr>
<td>Head has no Formal Education (Reference Category)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Primary</td>
<td>0.85*</td>
<td>0.698</td>
</tr>
<tr>
<td>Secondary</td>
<td>0.76***</td>
<td>0.615</td>
</tr>
<tr>
<td>Tertiary</td>
<td>0.82</td>
<td>0.606</td>
</tr>
<tr>
<td>Care Option 3 (did nothing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Region (Rural =1; Urban = 2)</td>
<td>0.55***</td>
<td>0.417</td>
</tr>
<tr>
<td>Gender (Male = 1; Female = 2)</td>
<td>0.94</td>
<td>0.771</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>1.01***</td>
<td>1.006</td>
</tr>
<tr>
<td>Per capita monthly expenditure</td>
<td>0.99**</td>
<td>0.998</td>
</tr>
<tr>
<td>Head has no formal education (Reference category)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Primary</td>
<td>0.50***</td>
<td>0.390</td>
</tr>
<tr>
<td>Secondary</td>
<td>0.43***</td>
<td>0.318</td>
</tr>
<tr>
<td>Tertiary</td>
<td>0.30***</td>
<td>0.154</td>
</tr>
</tbody>
</table>

Wald Chi2 127.20
Prob > Chi2 0.0000
Chi2 (8) for IIA test 7.52
Prob > Chi2 0.4814

Note: * represents significance at the 10 per cent level, ** represents significance at the 5 per cent level and *** represents significance at the one per cent level. The base care option was seeking professional care.
The study findings indicate that, ceteris paribus, the region of residence i.e. whether rural or urban does not significantly influence the probability of an individual self-medicating rather than seeking professional care. For individuals in urban areas relative to individuals in rural areas, the relative risk for doing nothing compared to seeking professional care would be expected to increase by a factor of 0.55 ceteris paribus. As this factor is less than one, individuals in rural areas are more likely to do nothing relative to seeking professional care compared to an individual in an urban area and this was statistically significant at the one per cent level.

The results as indicated in Table 9 show that for females relative to males, the relative risk for self-medication relative to seeking professional care would be expected to increase by a factor of 0.84 ceteris paribus. Thus, compared to females, males with malaria symptoms were more likely to self-medicate rather than seek professional care. This result was significant at the one per cent level. The results further indicate that gender is not statistically associated with the probability of seeking professional care compared to doing nothing.

In addition, we observed that for a one year increase in age, the relative risk for self-medication or doing nothing relative to seeking professional care would be expected to increase by a factor of 1.01, given that the other variables in the model are held constant. It can therefore be said that the likelihood of individuals self-medicating or doing nothing compared to seeking professional care increases with age and this result was significant at the one per cent level in both instances.

For a Kwacha increase in per capita monthly expenditure, the relative risk for doing nothing relative to seeking professional care would be expected to increase by a factor of 0.99. Thus, in line with the predictions of the Grossman model, higher income (as measured by household per capita consumption) statistically increases the likelihood of seeking professional care relative to doing nothing (at the 5% level). This result is also widely supported by existing empirical literature. The level of income does not, on the other hand, significantly influence the decision to self-medicate rather than seek professional care.

The results in Table 9 further show that for individuals from a household whose head has a Primary or Secondary school education relative to one whose head has no formal education, the relative risk of self-medication relative to seeking professional care would be expected to increase by a factor of 0.85 and 0.76 respectively. Therefore, an individual from a household whose head has a primary or secondary school education is statistically more likely to seek professional care rather
than self-medicate compared to one from a household whose head has no formal education. It is worthy of note that we do not find tertiary education of the household to be a significant influence of the decision to self-medicate rather than seek professional care.

Additionally, for individuals from a household whose head has a Primary, Secondary or Tertiary education compared to one whose head has no formal education, the relative risk of doing nothing relative to seeking professional care would be expected to be higher by a factor of 0.50, 0.43 and 0.30 respectively. As these factors are all less than one, it suggests that an individual from a household whose head has at least a primary school education is statistically more likely to seek professional care than to do nothing compared to an individual from a household whose head has no formal education.

5.0.3. Determinants of Out-of-Pocket (OOP) Health Care Expenditure

The results of the health care expenditure model can be analysed two fold since the study considered both the determinants of the probability of incurring any health expenditure and subsequently, the determinants of expenditures associated with seeking malaria treatment given that expenditures were incurred. We present results for the two part model with a log link and gamma distribution.

The findings are summarised in the following Table.

Table 10: Results of the Two Part Model (Log-Link, gamma distribution) for Malaria Health Expenditures

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coefficients</th>
<th>Robust Std Errs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region (Rural = 1; Urban = 2)</td>
<td>0.416***</td>
<td>0.0910</td>
</tr>
<tr>
<td>Gender (Male = 1; Female = 2)</td>
<td>0.022</td>
<td>0.072</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>0.008***</td>
<td>0.002</td>
</tr>
<tr>
<td>Per capita total household monthly expenditure</td>
<td>0.0009***</td>
<td>0.0003</td>
</tr>
<tr>
<td>Distance (kilometres)</td>
<td>0.007***</td>
<td>0.003</td>
</tr>
<tr>
<td>No Formal Education (Base Category)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Primary</td>
<td>0.109</td>
<td>0.124</td>
</tr>
<tr>
<td>Secondary</td>
<td>0.168</td>
<td>0.131</td>
</tr>
<tr>
<td>Tertiary</td>
<td>0.203</td>
<td>0.206</td>
</tr>
<tr>
<td>Other Provider (Base Category)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Public Health Centre</td>
<td>1.316***</td>
<td>0.150</td>
</tr>
<tr>
<td>Public Health Post</td>
<td>1.061***</td>
<td>0.170</td>
</tr>
<tr>
<td>Public District/Provincial/Tertiary Hospital</td>
<td>1.605***</td>
<td>0.181</td>
</tr>
<tr>
<td>Mission Hospital/Health Centre</td>
<td>0.563**</td>
<td>0.221</td>
</tr>
</tbody>
</table>
The results as shown in Table 10 reveal that individuals in rural areas are less likely to incur any health care expenditures in seeking malaria treatment and this result is statistically significant at the one per cent level. Additionally, residing in an urban area has a statistically positive association with the magnitude of malaria treatment related expenditures incurred.

The results in Table 10 also reveal that an individual’s gender does not statistically influence either the odds of incurring health care expenditures or the amount of expenditure incurred in seeking malaria treatment.

In addition, the coefficient of age suggests that increased age is associated with higher treatment expenditures as well as an increased probability of incurring malaria treatment expenditure. This result is significant at the one per cent level.

As expected, the results in Table 10 show income (as measured by per capita monthly expenditure) to be positively associated with the probability of incurring expenditure and the magnitude of expenditures incurred and this was statistically significant at the one per cent level in both instances.
The coefficient for distance to the health care provider is positive and highly significant at the 1% level in both models. Intuitively, having to travel longer distances to seek malaria treatment is likely to be associated with increased expenditures such as transportation costs.

The education of the household head does not significantly affect the probability of incurring health care expenditures but it does significantly influence expenditure associated with seeking malaria treatment. Individuals from households with heads who have at least a Primary education are significantly more likely to incur higher expenditures than those from households whose heads have no formal education.

As expressed in table 10, individuals who visited public or mission facilities were more likely to incur costs in seeking treatment than those who sought care from alternative providers. Conditional on some expenditure having been incurred, individuals who visited public facilities or mission facilities did however incur significantly lower costs than those who sought professional care from alternative providers.

5.1. DISCUSSION

This Chapter discusses the findings of the study. The results indicate that rural residency increases the probability of doing nothing relative to seeking professional malaria treatment services and this result affirms that of Hjortsberg (2003) who reported that residing in a rural area lowers the probability of seeking care in Zambia. This suggests that the infrastructure development projects that the country has had in the period since the Hjortsberg (2003) study have not addressed this inequity in access to health care services between individuals in rural and urban areas. The finding that region of residence significantly influences health care expenditures is corroborated by Hjortsberg (2003) who observed rural residency to be associated with lower expenditure for those who sought professional health care but contrasts Orem et al. (2013) who found no significant difference in health expenditure between rural and urban households in Uganda. These results suggest that individuals in rural areas in Zambia have lower access to and therefore spend less on malaria treatment services. It appears that malaria treatment and prevention efforts have been focused towards urban areas and this may explain why 72 per cent of malaria cases were reported in rural areas.
In addition, increased age is statistically associated with a lower likelihood of seeking professional care. The finding supports that of Lawson (2004) who reported age to be a significant determinant of health care seeking behaviour in the case of men in Uganda. This study also finds increased age to be statistically associated with higher treatment expenditures, a finding which contrasts that of Hjortsberg (2003) who reported age to be an insignificant determinant of health care expenditures when professional treatment was sought. The particular finding is however supported by Su et al. (2006), Moses (2014) and Brinda et al. (2014) who report age as being a significant determinant of health care expenditures in Burkina Faso, Nigeria and Tanzania respectively. On one hand, these results indicate that the younger population (who are more severely affected by malaria illness due to lower immunity) has more access to malaria treatment services but on the other hand, shows that increased age is associated with poorer malaria treatment care seeking patterns and increased barriers to malaria treatment services.

The study results also show that males are significantly more likely to self-medicate rather than seek professional care but gender does not significantly influence the decision to seek professional care rather than do nothing. Hjortsberg (2003) does not report gender to be a significant determinant of the decision to take any action i.e. self-medicate or seek professional care. The finding does however support that of Franckel and Lalou (2009) who reported that a child’s gender was not a significant determinant of whether they sought care or not in rural Senegal. Regarding the care options of seeking professional care as opposed to self-medication/self-care, Novignon et al. (2010) contrastingly report that female children were more likely to use self-care while male children were more likely to use public facilities. It is however worthy of note that the study by Novignon et al. (2010) was limited to considering the treatment choices for under five children in rural Ghana. An analysis of this study’s data shows that 75 per cent of surveyed households are headed by males and it is therefore important that males should especially practice appropriate treatment seeking behaviour. On the other hand, the finding that gender does not significantly influence expenditures contrasts Hjortsberg (2003) who reported being female to be negatively associated with health care expenditures in Zambia and Su et al. (2006) who found that females were more likely to report illness and therefore incur higher health care expenditures than their male counterparts in Burkina Faso.
The utilisation of malaria treatment services in Zambia appears to be characterised by a lack of equity as higher income levels are associated with a higher probability of seeking professional care and increased malaria treatment costs. This finding suggests that the poor have less access to malaria treatment services and this should be particularly alarming as 60.5 per cent of Zambians live in poverty (LCMS, 2010). These findings corroborate the earlier findings of Hjortsberg (2003) in Zambia, Yip et al. (1998) in China, Ngungi (1999) in a Kenyan district, Lawson (2004) in Uganda, Novignon et al. (2010) in rural Ghana, and Xu et al. (2012) in Myanmar. We however note that income was not significant in determining the choice of seeking professional care over self-medication, a result that contrasts the finding of Hjortsberg (2003). The contrasting result may be attributed to the wide availability of inexpensive drugs that may currently be easily accessed over the counter.

The inequality in accessing malaria treatment services is also highlighted when our findings on education are considered. Individuals from households whose head has at least a primary schooling are generally more likely to seek professional treatment compared to an individual from a household whose head has no formal education. Hjortsberg (2003) and Dzator and Asafu-Adjaye (2004) similarly reported the education of the household head to be a significant determinant of health care seeking behaviour. Franckel and Lalou (2009) did however report the educational level of the household head as being insignificant in their study of childhood malaria in rural Senegal. Hjortsberg (2003) similarly reported education of the household head to be positively related with health care expenditures in Zambia while Orem et al (2013) reported mother’s education to be positively related to health care expenditures in Uganda. The descriptive statistics as shown in table 8 show that nearly 30 per cent of Zambians lack any formal education and this may partially explain the low levels of utilisation of malaria treatment services in the country.

Following the abolition of user fees in rural areas and exemption policies instituted in most public healthcare facilities, we expected individuals visiting public providers and mission healthcare facilities for malaria treatment to incur less expenditure than those seeking professional treatment from alternative health care providers. The study results indicate that visiting a public facility is associated with a higher probability of incurring health care expenditures relative to having consulted from any other professional. This may be because several individuals who visited public facilities reported having incurred some amount to register at the facility whereas some of the
individuals who consulted other providers reported having visited a community health worker whom they did not have to pay. This result suggests that despite the abolition of user fees, expenditures are still incurred in seeking malaria treatment. The magnitude of expenditures incurred at public health facilities is however significantly lower than the expenditures incurred in seeking treatment from outside the public health sector. Policies to promote the usage of malaria treatment services should therefore promote the use of public health facilities.

The number of healthcare facilities in the country is still insufficient as distance continues to be a barrier to accessing malaria treatment since it is positively associated with the probability of incurring expenditures and magnitude health care expenditures. Considering the high levels of poverty in Zambia, proximity to health facilities is a significant barrier to malaria costs.

Our findings on some variables are distinguished from the findings of Hjortsberg (2003) who conducted a health seeking behaviour study that considered several diseases using data from the LCMS of 1998.

From the health care seeking behaviour model considered in this study, gender was found to be a significant determinant of the choice of self-medication rather than seeking professional care, whereas Hjortsberg (2003) found gender to be insignificant in the choice of care option. Also, our study did not find income to be significant in the choice to seek professional care rather than self-medicate whereas Hjortsberg (2003) reported income to be a significant determinant. Additionally, we find age to be significant in the choice of care option, while Hjortsberg (2003) did not report such significance except in the case of females below the age of six.

From our expenditure model, gender does not significantly influence expenditure, while Hjortsberg (2003) found being female to be negatively associated with health care expenditures. In addition, whereas Hjortsberg (2003) reported age as being insignificant in the amount of health expenditure incurred when professional care was sought, we found age to be a highly significant determinant.

From our health care seeking behaviour model, we report similar findings as Hjortsberg (2003) on the significance of region of residence, income (in the choice of seeking professional care compared to doing nothing) and household head’s education (except in the choice of seeking professional care compared to self-medication). The results of our health care expenditure model,
indicate some similar findings to Hjortsberg (2003) as we also found urban residency, higher income, greater distance to healthcare facility and increased education of the household head to be significant determinants of expenditures associated with seeking professional care.

The contrasting results with the earlier study on some of our choice variables demonstrates a need for caution in extending results from the analysis of health care seeking behaviour and expenditures for several diseases to the analysis of a specific disease, in our case malaria. An individual’s perception of malaria may cause them to choose a different care option than if they suffered from a different illness. The dissimilar results could in part be reflective of the different policy environment; as referred to in earlier segments, nearly all of the current anti-malaria policies were implemented after the point in time considered by the earlier related study. Reporting of some similar results does however show that some of the findings from studies considering general illness may be extended to a specific disease.

5.2. **Study Limitations**

It is acknowledged that the study results need to be adopted with caution because self-reported cases of malaria were analysed. There is some confidence in the estimations because the survey instrument included separate categorisations for other diseases with symptoms similar to malaria such as fever and headache. The description of the proportion of malaria incidence is also close to other survey estimates. The limitation is however acknowledged.

The national malaria policy seeks to ensure 85 per cent of patients seek treatment within 24 hours of symptom onset. Therefore, it would also have been interesting to establish how quickly treatment was sought from the onset of symptoms but the survey instrument did not capture this information.

Finally, the study could not examine the expenditures associated with self-medication because the survey instrument did not capture these expenditures.
CHAPTER SIX

CONCLUSION and STUDY RECOMMENDATIONS

6.0. Conclusion and Policy Recommendations

The objectives of this study were two-fold. Firstly, it was sought to determine the factors that influence the decision by individuals to either seek professional care, self-medicate or do nothing among individuals with malaria. Additionally, the study sought to examine the expenditures associated with seeking malaria treatment. Using data from the 2013 Zambia Household Health Expenditure and Utilisation Survey, a multinomial logistic regression was used to analyse the demand for malaria treatment and a two part model to analyse the expenditures associated with seeking professional care for malaria treatment.

The analysis of the data revealed that malaria accounts for 45 per cent of reported illness in Zambia and 31 per cent of individuals with malaria symptoms did not seek professional care. The results of this study show that several barriers to malaria treatment exist such as region of residence, education and income. This is despite the abolition of user fees and a scale up of malaria treatment interventions. In addition, out of pocket expenditures are influenced by factors including region of residence, distance to facility, income and education. This may mean that individuals residing in rural areas and the poor have access to fewer or no malaria treatment services, especially if the health facilities are distant. Moreover, education being a major determinant of accessing professional treatment services implies that the less educated citizens are disadvantaged and do not access appropriate treatment services.

From the finding that region of residence was a significant determinant of the demand for malaria treatment services and expenditure, it is recommended that the government continues with the construction of health posts in the country and ensures that the new facilities have malaria diagnosis tools and appropriate anti-malaria drugs. This will also lessen distances to facilities and associated transport costs thereby reducing the implicit and explicit costs associated with seeking malaria treatment.

Further, it is being recommended that the government escalate awareness campaigns to promote the seeking of malaria treatment within 24 hours of the onset of symptoms. A cost effective means of implementing such a campaign may be made through the educational system especially at
primary and secondary school levels. Another cost-effective option would be to collaborate with religious bodies on such awareness campaigns since our analysis of the statistics reveals nearly 98 per cent of individuals in the entire sample belong to a religious grouping. Policy makers should therefore continue to promote the initiation and implementation of malaria prevention and treatment programmes at the community level, especially in rural areas.

The study revealed that self-medication continues to be a popular care option in Zambia. It may be worthwhile for policy makers to consider the promotion of policies to train personnel in drug stores and pharmacies in the correct diagnosis of malaria and ensure appropriate medication is only administered to individuals with clinically or laboratory confirmed malaria. Coupled with the public awareness campaigns, this may aid in curtailing the use of self-medication while also expanding avenues for the early diagnosis and treatment of malaria. Males should be especially targeted in these campaigns.

Following the study findings on income, we recommend the consideration of policy options which may enable individuals to have smooth access to health care services. These options will also provide a financial safety net for older individuals since we observe a significant and positive association between age and expenditure incurred.

6.1. Recommendations for Future Research

Based on the identified study limitations, future research can consider how quickly malaria treatment is sought from the onset of symptoms and additionally examine the expenditures associated with self-medication. There is further scope for research in conducting a full analysis of the annual disease burden of malaria in Zambia.
## APPENDIX

**Table 11: Correlation matrix**

<table>
<thead>
<tr>
<th></th>
<th>Opd expenditure total</th>
<th>Region</th>
<th>sex</th>
<th>age</th>
<th>Per capita expenditure</th>
<th>distance</th>
<th>tertiary</th>
<th>secondary</th>
<th>primary</th>
<th>Public health centre</th>
<th>Public health post</th>
<th>Public district/pr.ovincial/tertiary hos.</th>
<th>Mission facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opd expenditure total</td>
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<td>region</td>
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<td></td>
</tr>
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<tr>
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<td>0.081</td>
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<td></td>
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<tr>
<td>Per capita expenditure</td>
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<td>distance</td>
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<td>0.0618</td>
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<tr>
<td>tertiary</td>
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<td>0.1895</td>
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<td>0.0576</td>
<td>0.3753</td>
<td>0.0359</td>
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<tr>
<td>secondary</td>
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<td>Public health post</td>
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<td></td>
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</tr>
<tr>
<td>Public district/pr.ovincial/tertiary hos.</td>
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<td>0.0227</td>
<td>0.04</td>
<td>0.0347</td>
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<td>-0.1449</td>
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<td>Mission facility</td>
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<td>0.0173</td>
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</table>
Table 12: Variance-inflating Factors

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<tr>
<th>Variable</th>
<th>VIF</th>
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</thead>
<tbody>
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<td>Primary education dummy</td>
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<td>0.3910</td>
</tr>
<tr>
<td>Secondary education dummy</td>
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</tr>
<tr>
<td>Tertiary education dummy</td>
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<td>0.6032</td>
</tr>
<tr>
<td>per capita monthly expenditure</td>
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</tr>
<tr>
<td>Region</td>
<td>1.15</td>
<td>0.8695</td>
</tr>
<tr>
<td>Age</td>
<td>1.02</td>
<td>0.9846</td>
</tr>
<tr>
<td>Sex</td>
<td>1.00</td>
<td>0.9977</td>
</tr>
</tbody>
</table>

Mean VIF 1.60
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