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Household Expenditure on Prevention and Treatment of Malaria in Khartoum State during a Transmission Season September 2003.

By

Muna Hassan Mustafa Hassanein

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Supervisor

Professor Mohamed Ali Awad Elkariem

DIP MSc PhD MOIH MIOHS

Co-supervisor

Dr. Muneef Abdelbagi Babiker

BSC MSc PhD

DEDICATION

TO MY

PARENTS……

HUSBAND……

DAUGHTER AND SONS….

SISTER AND BROTHERS.

ACKNOWLEDEGEMENT

I would like to express my utmost gratitude to my supervisor; Professor Mohamed Ali Awad Elkareim for his invaluable advice and guidance. I would like also to thank Dr. Muneef Abdelbagi Babikir for his great and valuable assistance.

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CHAPTER FOUR

List of abbreviations

COI	Cost Of Illness
GDP	Gross Domestic Product
HCM	Human capital method
ITN	Insecticide Treated Nets
NGO	Non-governmental Organization
SD	Sudanese Dinars
WHO	World Health Organization
WTP	Willingness To Pay

ABSTRACT

Malaria represents a major public health problem in Khartoum State. It is responsible for 24% of disease episodes seen at outpatient departments.,13.4% of inpatients admittance and 10% of hospital deaths. Combating malaria needs mutual efforts from both the government and the community. For the successful implementation of control measures, the economic impact of malaria on households as a whole, and in different subgroups of the population need to be known. This is needed first to target the population by equitable and efficient interventions. And second to promote the uptake of preventive measures by the households and guide them in their care seeking practices.

This study was conducted to estimate the out-of-pocket expenditure related to malaria prevention and treatment by households, and the effects of care seeking behaviour, socioeconomic status, health insurance coverage and residential area on these expenditures, during the transmission season in Khartoum State during the year 2003.

A total of 904 households, selected by the stratified, cluster sampling techniques, were included in the study. Two pre-tested questionnaires were used to collect retrospective data about prevention practices and prevention expenditure. Data about care seeking behaviour during simple malaria episodes and expenditure on malaria treatment during September 2003 were also collected.

The results revealed a low use of preventive measures in all sectors of the population and especially among those of low socioeconomic status and residents of rural areas and camps. There was no significant difference in the incidence of malaria among the different income groups. On the other hand rural areas and camps had a significantly higher incidence than urban areas. There was a high rate of health facility use and low rate of self treatment for malaria management. Use of governmental health facilities was higher than use of private facilities. The mean annual expenditure on malaria prevention was 2944

Sudanese Dinars (SD) (5517) per household, and the median was 1400 SD. This depleted 0.6% of the annual income of the population. The mean monthly expenditure on malaria treatment per household was 2710 SD (2191) and the median was 1100SD, depleting 5.9% of the monthly income of the population. In both instances, and in absolute terms, the expenditures were low for low income groups and for those residing in rural areas and camps. However, on relative terms households from low income groups and rural areas and camps suffer a greater burden. The expenditure on treatment per fully cured patient was 1391 SD (1334) and the median was1070SD. It was lower for those with Health Insurance Corporation coverage. It was higher for those who used health facilities, especially those of the private sector. Expenditure on drugs comprised the greatest proportion of all treatment expenditure (45.1%), and this proportion is anticipated to increase even more after the adoption of new combination therapy.

It was concluded that malaria places a tremendous economic burden on households of Khartoum state especially those of low socioeconomic status and those residing in rural areas and camps. The relatively high treatment expenditure compared to preventive expenditure can be due to the high accessibility to health services in the Khartoum and low coverage by health insurance in one hand and low preventive measures uptake by the population on the other hand.

It is thus recommended that this economic burden should be reduced through:

- Increasing coverage by preventive measures to reduce treatment costs in long run.
- Expanding coverage by health insurance.
- Educating the population on how to channel their expenditure rationally and insuring rational use of drug at facility level.

- Studies to quantify the indirect cost of malaria including cost of treating malaria on an inpatient bases, should be conducted to reflect the whole burden that falls on households.

ملخص

تشكل الملاريا واحدة من أكبر المشاكل الصحية في ولاية الخرطوم، 24% من الحالات المرضية التي تتم معاينتها في العيادات الخارجية للمؤسسات العلاجية بالولاية هي حالات ملاريا، كذلك تمثل حالات الملاريا 13.4% من الدخولات بالمستشفيات و هي مسئولة عن 10% من الوفيات التي تحدث بالمستشفيات بالولاية. مكافحة المرض تحتاج الى جهود مشتركة من ناحية الحكومة و المجتمع على حد سواء. معرفة الاثر الاقتصادي الذي للملاريا على السكان عموما على المجموعات السكانية المختلفة بولاية الخرطوم مهما، لنجاح استراتيجيات مكافحة الملاريا كالتشخيص و العلاج المبكر للمرض و استراتيجيات مكافحة الناقل. و تنبع اهمية هذه المعلومة اولا: في الحوجة اليها لتطبيق تدخلات فعالة تضع المجموعات ذات التأثر الأكبر بالاثر الاقتصادي بالملاريا في الاعتبار. و ثانيا: لتعزيز و تشيجع السكان للمشاركة في مكافحة الملاريا و تحسين سلوك طلب العلاج لديهم.

تم اجراء هذه الدراسة لتقدير الصرف المتعلق بالوقاية من، و علاج مرض الملاريا بواسطة السكان بولاية الخرطوم و لتحديد اثر المستوى المستوى الاقتصادي للاسرة، التغطية بالتامين الصحي وسلوك طلب العلاج على هذا الصرف و ذلك خلال موسم الانتقال للعام 2003 م.

تم اختيار 904 اسرة بواسطة العينة الطبقية العنقودية العشوائية المنتظمة. تم جمع البيانات بواسطة استبيانين مشفرين و مختبرين لجمع البيانات التالية: الممارسة تجاه مكافحة الملاريا و الصرف عليها خلال السنة الفائتة، بالاضافة الى سلوك طلب العلاج و الصرف على العلاج لحالات الملاريا خلال الشهر الماضي (سبتمبر 2003م).

اوضحت النتائج ان استخدام وسائل مكافحة الملاريا بواسطة المجتمع متدني و خاصة وسط ذوي الدخل المنخفض و قاطني المناطق الريفية و المعسكرات. لم يتم التوصل الى فرق في معدل الاصابة بالملاريا بين السكان من مختلف فئات الدخل بينما كان معدل الاصابة بالملاريا في المناطق الريفية و المعسكرات اكبر منه في المناطق الحضرية خلال شهر سبتمبر 2003 م ($p<0.05$) .كان هناك معدل استخدام عالي للمؤسسات العلاجية لعلاج الملاريا مقارنة مع العلاج الذاتي. متوسط الصرف السنوي على مكافحة الملاريا بالنسبة للاسرة الواحدة تم تقديره ب 2944 دينار سوداني (5517) و الوسيط 1400 دينار سوداني و يمثل 0.6% من متوسط الدخل السنوي للسكان. متوسط الصرف الشهري على علاج الملاريا خلال موسم الانتقال بالنسبة للاسرة الواحدة قدر ب 2710 دينار سوداني (2191) و الوسيط 1100 دينار و يمثل 5.9% من متوسط الدخل الشهري للاسرة. في كلتا الحالتين فان الصرف منفض بالنسبة للاسر ذات الدخل المنخفض و التي تقطن في المناطق الريفية و المعسكرات. و لكن الاسر ذات الدخل

المنخفض و تلك التي تسكن المناطق الريفية و المعسكرات يقع عليها عبء اقتصادي اكبر نسبيا، حيث يستهلك هذا الصرف على مكافحة و علاج الملاريا قسما اكبر من متوسط دخولهم الشهرية و السنوية. التكلفة المباشرة لعلاج حالة ملاريا واحدة حتى تمام العلاج هي 1391 دينار سوداني (1334) و الوسيط هو 1070 دينار سوداني. هذه التكلفة كانت اقل بالنسبة للذين لديهم تغطية بالتأمين الصحي. كذلك كانت التكلفة اقل للذين اخذوا علاجا ذاتيا مقارنة بالذين تلقوا العلاج في مؤسسة علاجية. بالنسبة لهؤلاء الاخيرين كانت التكلفة اقل بالنسبة للذين تلقوا العلاج في مؤسسات حكومية او تابعة للمنظمات التطوعية مقارنة بالذين زاروا مؤسسات علاجية خاصة. شكل الصرف على الادوية النسبة الاكبر من الصرف الكلي على علاج الملاريا و من المتوقع زيادة هذا النسبة بعد اعتماد العلاج المزدوج.

بهذا نخلص الى ان الملاريا تشكل عبئا اقتصاديا كبيرا على الاسر بولاية الخرطوم خاصة اولئك من ذوي الدخل المنخفض و من الذين يسكنون المناطق الريفية والمعسكرات. الصرف العالي على علاج الملاريا مقارنة بالصرف على الوقاية منها يمكن تعليله من جهة بالاتاحة الكبيرة للمؤسسات العلاجية بولاية الخرطوم و التي ساهمت في زيادة الاستخدام بواسطة المواطنين، بالاضافة الى التغطية المحدودة بالتأمين الصحي خاصة في القطاع الحر، هذا يقابله الاستخدام المتدني لوسائل الوقاية من جهة اخرى.

و لهذا نوصي بالاتي:

- بزيادة التغطية بوسائل مكافحة الملاريا لتقليل الصرف على العلاج على المدى الطويل
- زيادة التغطية يالتامين الصحي.
- تثقيف المواطنين لترشيد الصرف على العلاج و ذلك باختيار المصادر المثلى لعلاج الملاريا، بالاضافة الى ضمان الاستخدام الرشيد لعلاج الملاريا في المؤسسات العلاجية
- . اجراء دراسات لتقدير الاثر غير المباشر للملاريا على الاسر عبر فقدان زمن الانتاج يساعد على عكس الصورة الكاملة للاثر الاقتصادي للملاريا.

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CHAPTER ONE

1. INTRODUCTION AND LITERATURE RVEIW

1.1 1.1Preface

Malaria ranks among the major health and development challenges taking an enormous toll on human health and well being [1,2]. Endemic in ninety-one countries, accounting for 40 percent of the world's population, malaria affects an estimated 300 million people annually[1].It represents the primary reason for reporting to public health facilities[3], and is responsible for more than 1 million deaths per year.[1]

In addition to the health burden- malaria places an enormous economic burden on the households in endemic regions [4]**.** It impedes the social and economic development of the people through lost productivity and through expenditure on treating and preventing the illness.[4,5]

When compared to other diseases, an attack of malaria is estimated to costs households almost the same as combination of other illnesses in communities where malaria is holo-endemic [6]**.**

The fundamental principles underlying all economic analyses of malaria are that expenditure on its eradication is a form of investment (rather than consumption)[7]. Thus policies which strengthen public health measures encourage individual prevention and increase effective access to treatment is money well spent [6].

1.2 1.2. Health Burden of Malaria in Khartoum State:

In Khartoum malaria accounts for 24% of all patients seen at outpatients departments, 13.4% of hospital admissions, and 10% of hospital deaths [8].

From the figures mentioned above, it is clear that the greater share of households' treatment expenditure goes to malaria. One of the determinants of the level of the out-of-pocket expenditure on treatment is

the method of payment at the point of service delivery. This in turn depends on the insurance status of the patient. At government facilities patients who are covered by the Health Insurance Corporation pay only part of the drug cost (25%). Non insured patients pay directly out of pocket for malaria management.

At Non-Governmental-Organizations (NGOs) and the private sector facilities services are provided on a fee-for-service bases.

Patients also determine the level of out-of-pocket expenditure through their care seeking bahaviour during malaria episodes. In Khartoum State patients can chose from a wide range of health care providers, they may resort to self-treatment or they ignore the illness completely. As drug and services prices differ from one health care provider to the other, the level of expenditure will vary according to the provider chosen.

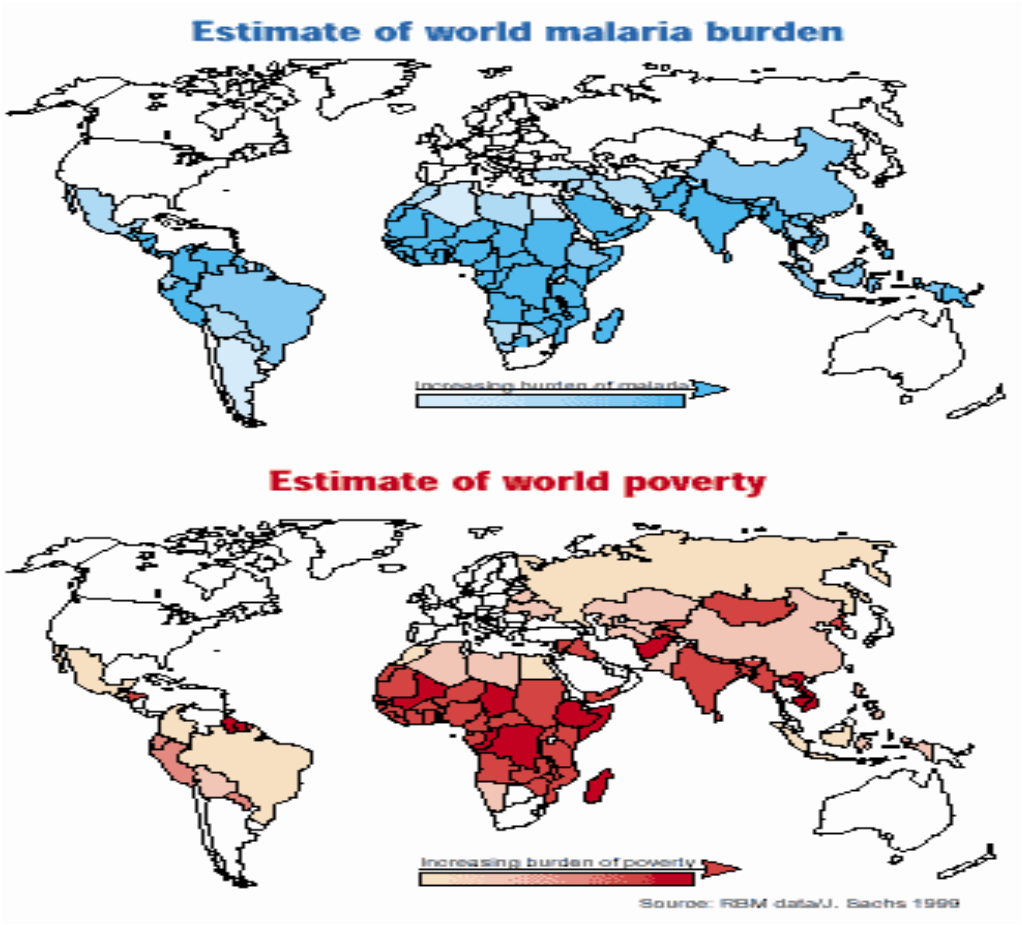
Level of expenditure on prevention measures by the population depends on whether they use prevention measures and the type of the preventive measure they uptake. However individuals usually tend not to spend money on preventive services and wait for the disease to develop before taking any action. This can be shown by the poor involvement of Khartoum State community in malaria control activities[9]. Even activities such as environmental management that depend mainly on physical activities do not attract the interest of the population. This lack of community participation was supported by the results of two studies conducted during 2001, both reported low uptake of preventive measures by the population of the State (Drugs: 12.4% - Untreated nets: 17.2% - ITNs: 11.5% - Mosquito coils: 7.1% - Others (primarily environmental management): 29.4%[10] - screened windows5%[11].

Before any steps that can be done so that access to malaria prevention and care can be enhanced , it is necessary to have an idea of the total cost of

care to individuals and households and more importantly the amount incurred by different subgroups.

1.3 1.3. Malaria and Poverty

Malaria and poverty are intimately connected[12]. Malaria is frequently referred to as a disease of the poor or a disease of poverty[13]. Malaria risk has always been very geographically specific, intensive malaria is confined to the tropical and subtropical zones. Poverty is also geographically specific. Poor countries predominate in the same regions as malaria. Almost all of the rich countries are outside the bound of intensive malaria[12,13].



29% of the 150 countries with populations over one million in 1995, which account for over 99 percent of the world's population, have

intensive malaria. Thirty-five of these 44 countries are in Africa. The average Growth Domestic Product (GDP) per capita in 1995 for the malarial countries was $1,526, compared to an average income of $8,268 in the countries without severe malaria, more than five times higher. Ranking the 150 countries by income per capita, all but three of the 44 countries with severe malaria are in the bottom half of the ranking. Of the 119 poorest countries, all but twelve have some incidence of malaria. The richest 31 countries are free of malaria[12].

Not only are malarial countries poor, but the economic growth in malarial countries over the past quarter century has been dismal. Growth of income per capita from 1965 to 1990 for countries with severe malaria has been 0.4% per year, while average growth for other countries has been 2.3%. More than a third of the countries with severe malaria (11 out of 29) had *negative* growth from 1965 to 1990[12].

A small number of the countries that had severe malaria in the twentieth century eliminated the disease. Many other changes were simultaneously occurring in the economies of these countries before and after eradication, but in almost all cases, the countries experienced an acceleration of growth immediately following eradication, and faster growth than neighboring countries. Malaria control within regions of some other countries has had dramatic impacts on agricultural output and settlement patterns[12].

1.4 1.4. Mechanisms Affecting Economic Development:

Malaria has adverse consequences for economic development. The key mechanisms through which this occurs include:

- **Expenditure on Treatment And Prevention By Households**: One of the direct effects of malaria is that expenditures on its treatment and prevention erode households savings and drain on their resources[6,14].

Households may respond to the risk of high financial expenditure for serious illness by reducing their level of investment, or investing in assets which have higher liquidity but lower returns. Households may be reluctant to invest in productive activities or child schooling, again depressing productivity in the longer term[14,15,16]. Investments in education and physical capital have proved to be the engine of growth in many of the rapid growth economies. The direct economic burden that malaria places on households can therefore have long-term consequences for economic growth[14,17].Nur (1993) documented the negative impact of malaria on household savings, in Gezera, Sudan as families are forced to hire labor to compensate for days lost to morbidity.

- **Supply and Efficiency of Labour**: Malaria potentially affects both the volume and the productivity of inputs[1].Malaria causes incapacitation of, and total or partial withdrawal of labour from production. The usual observed trend at the onset of malaria infection is that, it slows down individual work rates and induces a postponement of less urgent tasks[6,18]. The consensus estimates suggest that attacks, depending on severity, typically entail a loss of four or more working days, followed by additional days with reduced work capacity[1].
- **The Effect on Child Development and Ability to Benefit from Schooling:** Malaria attacks are a major cause of school absenteeism, and appear to negatively impact long term learning capacity; reducing the accumulation of human capital over time[1,12,15]. It was estimated that in Kenya, primary school students miss 11 percent of school days per year because of malaria, and 4.3 percent of secondary school days. In Nigeria, it was found that between 2 to 6 percent of the school year is lost. A study in the Solomon Islands found that the average case of

malaria in children between 7 and 13 years of age caused a loss of 5.3 days of school. Another study in Kenya found 13-50% of medically related absences were attributable to malaria[14].

- **Specialization of Labour:** Households may limit the specialization of labour and maintain labour reserves to reduce the risk of labour shortage at key times of the year, this reduces productivity[1, 15,16].
- **Mobility within Malarial Regions:** Another channel through which malaria may affect the economy is limitation on internal movement. Lack of acquired immunity may inhibit the better educated, the ambitious and the local traders from travel within malarial regions, therefore limiting the development of markets that form the building blocks of economic growth. In addition to that it prevents transmission of ideas, techniques, and development of transportation systems and tourism[1,12,14,16]. Similarly fear of contracting the disease through travel to the malarial regions may discourage foreign trade and investment[1,12,14]. The risk of malaria acquisition also has been documented to have a significant impact on population mobility and settlement in new lands, with consequent impacts on economic growth and development. This can be shown in the case of India and Brazil where colonization of new lands was inhibited by malaria[1,19].
- **Concentration on Subsistence Crops:** Amongst subsistence level households, where the tolerance of risk is very low, the threat of malaria can encourage households to adapt their land use decisions to accommodate the risk. For example, farmers at high risk of contracting the illness are less likely to plant cash crops, instead relying on subsistence crops. The cash crops, though more profitable, require greater labor input, with harvests suffering greatly if not tended in time. Subsistence crops, on the other hand, are more

resistant and hence do not need as much attention at specific times, this resulting in lowered economic productivity[1,6,14].

- **Coincidence with Peak Of Agricultural Production:** In certain settings the peak in malaria morbidity has been found to coincide with the peak demand for labour and therefore the peak of the opportunity costs of time[15,20].
- **High Fertility Rates:** There are several hypotheses as to the reason for the link between fertility and mortality. One explanation is that parents have additional children to replace the ones that they lose. [10]working age parents with fewer children to support can afford to save and invest more both in physical capital and in human capital through the education of their children[14].
- **Child Mortality Economy**: Another loss is the opportunity cost of time and resources invested in infants who do not survive. The disease burden of malaria in endemic areas falls predominantly on children, and approximately one million children under five are lost to the disease every year. Aside from the human cost of this loss, the economic value of resources invested in these children can be significant. In high mortality societies this number was substantial[14].
- **Women Productivity:** A high mortality-high fertility environment imposes subtler though no less significant costs through its effects on the productivity of women. When women have very high fertility rates, parents may choose to invest less in the education of their daughters, knowing that they are likely to spend a significant portion of their working years involved in child-rearing activities rather than in the labor force where they would reap the economic returns to education. Moreover, while the hours they spend caring for a young child may not represent a majority of their workday, women will undoubtedly be limited in their employment choices by the need to be

available to the child, with a resulting loss in work opportunities and job experience. Over the long-term such factors can have a sizeable impact on economic growth and productivity[14].

- **Links between Malaria and Other Illnesses** There is substantial evidence of links between malaria and a number of other illnesses. To the extent that malaria is a contributing factor for other illness it is necessary to attribute to it a share of the entire range of direct and indirect costs associated with those illnesses. Acute and chronic malaria infections can alter the immune system and increase vulnerability to other infections and response to vaccines. Malaria is also associated with hyper reactive malarial splenomegaly, chronic renal damage and the nephrotic syndrome, and Burkitt's lymphoma. It has been found to inhibit appetite and growth in children and infants. Furthermore, acute malarial infection can have chronic health consequences: cerebral malaria has been found to cause long-term neurological damage in a significant percent of those who do survive. Perhaps most tellingly, the presence of malaria has represented such a significant disease burden through the ages that it has led to a potentially deadly genetic modification causing approximately 130,000 infants in Africa to be born each year with sickle cell disease[14].

1.5 1.5. Economic impact of malaria; Perspective:

The economic impact can be analyzed either from the perspective of individual, household or society as a whole (nation), in other words costs of malaria can be analyzed either from a microeconomic or macroeconomic perspective[20].The microeconomic level study considers the impact of the disease on individuals and households and is useful in assessing the ability of individuals and households to afford health care[21].

The macroeconomic effects could be analyzed through the evaluation of national control programmes in relation to national product[20]. The availability of the level of macroeconomic can aid in the health planning and cost effectiveness analysis[21].

1.5.1. Macroeconomic Level:

The most direct way to assess the causal effect of malaria on a country economic performance is to look at the relationship between economic growth, initial malaria levels and the change in malaria over the same period[12].

Recent attempts to assess the economic burden of malaria using cross-country regression analysis have found the disease to be a significant factor in long-term economic growth and development[14]**.**

Controlling for factors such as tropical location, colonial history, and geographical isolation, countries with intensive malaria had income levels in 1995 only 33% of countries without malaria, whether or not the countries were in Africa. Cross-country regressions for the 1965-90 periods confirmed the relationship between malaria and economic growth. Taking into account initial poverty, economic policy, tropical location, and life expectancy among other factors, countries with intensive malaria grew 1.3% less per person per year[12,14].

An impact of this magnitude could mean that over the long run malaria alone could reduce per capita GDP by almost half in highly endemic countries[14]. A 10% reduction in malaria was associated with 0.3% higher growth[1,5,12,13,15].

None of the other tropical diseases had a significant negative correlation with economic growth after controlling for malaria in these regressions[12].

Economic development may influence malaria morbidity by providing households with the means to invest in antimalaria protection, and in full medical treatment cycles. Furthermore, governmental capacity to provide comprehensive access to rural healthcare and to engage in local mosquito control arguably increases with economic development[1]. It is thus clear that fighting malaria requires significant financial and organizational recourses, yet malaria restrains economic development threatening a vicious cycle[1].

The ubiquity of malaria in some regions leads not only to high prevention and treatment costs and a loss of labor, but also to modifications of social and economic behavior, with potentially serious consequences for economic growth and development[14].

1.5.2. Microeconomic level:

This can be classified into direct, indirect, and intangible costs[16,21,22].

- **Direct Cost:** Direct costs are generally defined as expenditure on prevention and treatment of malaria by households and governments[16,20,22].
- **Indirect Costs:** Indirect costs components relates to the value of time lost to malaria through morbidity and mortality for both patients and the government[12,16,21,22]. These indirect costs are regarded in the literature as one of the key determinants of economic cost. The justification for this emphasis is provided by human capital theory, which regards investment in health improvement as akin to investment in physical assets with the benefits to be measured in increased output in economy[20].
- **Other Cost (Intangible Costs):**

  Malaria affects the quality of life of the victims as it can reduce the desire to consume food and other recourses for a happy and enjoyable

life. It also causes suffering, grief and pain, and leads to loss of leisure time, however these forgone consumptions and pleasures are not easy to quantify[14,20,21] and are rarely included in cost calculations[12].

1.6 1.6. Direct Cost To Households:

This can be classified into:

- **Prevention Related Expenditure:** Cash payment for preventive measures taken by individuals and households[20].
- **Medical Direct Costs** (**Expenditure On Treatment**): These include cash payment for consultation, laboratory tests and treatment[20,21].
- **Non-medical Direct Costs**: These include cash payment for transportation to seek treatment, and the cost of special foods and drink purchased by families to help deal with malaria[12,20,21].

1.6.1. Measurement of Direct Cost to Households:

It should be noted first that there is no definitive accounting system for costing illness, the range of effects and burdens that ill-health imposes is difficult to define and measure so it is difficult to allocate costs to multiple dimensions of illness[12].

The state of the art for costing a disease like malaria has not progressed to the point where a dominant paradigm can be said to exist. Rather, there are competing schools of thought, each of which directly addresses some piece of the puzzle at the expense of leaving some other aspect of the problem for a competing methodology[14]**.** Costing methodologies include the following:

Cost of Illness Approach (COI):

The standard approach used by economists to evaluate the micro-economic burden of disease is the cost of illness (COI) methodology. Since it was formalized in the early 1960s, this methodology has become a standard costing technique used in health economics to evaluate the cost

of a particular illness to society. COI calculation procedures have bifurcated along two alternate approaches that are often referred to as[14]:

1. **The human capital method (HCM)**[14]

   The HCM attempts to account for the direct costs associated with an illness. Direct costs refer to both private medical care costs and non-private medical care costs. Private medical care costs are private expenditures on prevention, diagnosis, treatment and care of the disease. They include such factors as expenditures on bed nets, doctors fees, the cost of anti-malarial drugs, the cost of transportation to medical facilities and necessary support for the patient and, if applicable, an accompanying adult, for the duration of stay at the facility. Non-private medical care costs are public expenditures on both prevention and treatment of the disease. They include expenditures by the government on such factors as vector control, health facilities, education and research. The majority of studies attempting to evaluate the burden of malaria on households have used the human capital approach[14].

2. **The willingness-to-pay approach (WTP)** "contingent valuation": in willingness-to- pay calculations, the objective is to deduce (by survey and/or revealed preference) the monetary value that an individual associates to incremental variations in his or her risk of illness or death[10].It has been argued that the theoretically appropriate way to assess the true cost of malaria on the welfare of the household is to determine the value that it would put on avoiding the disease. If it were possible to elicit a dollar value that the household would pay to prevent the disease, it would presumably capture the burden to the household of treatment costs and lost productivity, as well as the value of the leisure time given up and the cost of the pain and suffering associated with the disease, and other intangible costs which are

difficult to price. However, WTP, which was developed originally to assess values for public goods such as the environment, has come under much criticism in the context of "existence" values, which do not derive from private consumption of a good. It has also been pointed out that the results are sometimes subject to personal interpretations of questions and can be biased by respondents' desire to engage in strategic behavior. Based on the difficulty of conducting effective WTP studies there are few examples of this approach that can be used to assess the personal costs of malaria[14].

The total estimated costs returned by each of these approaches will continue to be highly dependent on the choice of methodology[14].

1.6.2. Units of Analysis of Costs:

The units of analysis in the cost of illness studies, included cost per illness episode, cost per patient, or the household cost of illness. The household is preferred as a unit of analysis for assessing the economic costs and consequences of illness, because decisions about treatment are based on negotiations within the household (but not necessarily from an equal bargaining position), the costs of illness do not only fall on the sick but on other household members who care for the sick and accompany them to get treatment, and because the costs of illness fall on the household budget which has implications for the resources available to other members[12].

1.6.3. Expenditure on Malaria Prevention:

Households use a range of preventive measures such as mosquito coils, aerosol sprays , bed nets, and mosquito repellents to differing degrees in different areas.[20] Evidence had shown that the monthly per capita household expenditure on malaria related preventive methods ranges between $0.05 per person in rural Malawi and $2.10 in urban Cameroon,

equivalent to between $0.024 to $15 per household[20]. Guiguemde et al (1994)[24] had found in an urban area in Burkina Faso that the prevention costs per 6 months (the transmission season) was US$ 33 per family. Expenditure on prevention tends to be highly skewed: for example in Malawi, only 10% of households reported any preventive expenditures in the preceding month[20].

1.6.4. Expenditure on Malaria Treatment (Direct Medical Cost):

Evidence shows that significant sums of money are spent privately on malaria health care in very low income areas, for non-prescription drugs, on consultation, laboratory investigations and antimalaria drugs, in addition to traditional medicines. Many studies in developing countries had found that families spend between 2-5% of their income on private medical care and drugs[7].

There have been studies of direct costs in Brazil, India, Indonesia , Thailand, Malawi, The Gambia, Sudan, Iraq, Rwanda, Burkina Faso, Chad, and the Congo[7,20].

The treatment related expenditure (monthly per capita)ranged between $0.041 and $ 3.88 per person equivalent to between $ 1.88 and $ 26 per household[20], when measured per case the costs ranged from an average of $ 8.77 per case in Congo to $.07 in Chad[7].

Ali et al(1998) in Sudan, Wad Medeni town (Gezira state) found that the mean total cost of treatment of a single episode of malaria was US$ 5.2[23]. Guiguemde et (1994) had found in an urban area in Burkina Faso that the average total cost of malaria treatment per 6months (the transmission season) was US$ 42 per family[24].

In Brazil Vosti (1990) found that the median direct cost of malaria treatment was Cr$70.000 per bout, and the mean was Cr$123.000 per bout[25]. In Guyana Coast, Booth and Maclean (2001), showed that the

average treatment expenditure per case was US$0.96 for those who sought treatment from public facilities and US$ 13.74 per case for those who went to private facilities[26]. Onwujekwe et al (2000) found the average malaria expenditure for treatment to be US$ 1.84 per household per month in a malaria holo endemic region in Nigeria[6]. Asenso-Okyere and Dzator (1997) found that the direct cost of malaria in two districts in Ghana to be US$ 1.81 per case[21]. In Sri Lanka Attanayke et al (2000)estimated the direct cost of malaria treatment to be US$ 1.68 per fully treated case[4]. In all the above mentioned studies the Human Capital Method was used to estimate the direct cost of treatment. In China Jackson et al (2002) estimated the total cost (direct and indirect) to be US$ 3.48 per case[37]. A recent study of the willingness-to-pay to avoid malaria was conducted in Tigray region, Ethiopia. The population in this area put a value of preventing malaria with vaccines of approximately $36[14].

This result indicated that cost estimates using the WTP approach are higher than those estimated by the HCM.

Regarding the breakdown of treatment expenditure, it was noticed that a large proportion of spending on malaria treatment goes towards pharmaceuticals, for example in Ghana expenditure on drugs accounted for 62% of direct costs for mild malaria and 70% for severe malaria[12]. In Burkina Faso expenditure on drugs accounted for 34.9% of all treatment costs[24].

Transport costs for seeking malaria treatment are also significant, particularly for rural populations needing to travel long distances, for example transport accounted for 22% of the direct costs of malaria in SriLanka[4] and 14% in Ghana[21].

Some studies also illustrated the importance of non-medical costs for households, in particular special foods to aid recovery from malaria: in

one study conducted in Sri Lanka 46% of household spending on malaria treatment went on special foods[4]. However, in the Sri Lankan context the high proportion of treatment spending going towards non-medical items such as food, reflects the relatively low medical costs incurred by patients due to widespread use of free public facilities[12].

1.6.5.Coping:

Coping strategies can be defined as a set of actions that aim to manage the costs of an event (shock) or process that threatens the welfare of some or all of the household members. Ultimately coping strategies are seeking to sustain the economic viability and sustainability of the household[12].

Coping strategies are vitally important for poor households faced with illness cost shocks, since the costs associated with serious illness can absorb a large proportion of the household budget and therefore require the mobilization of substantial additional resources. Even minor illness costs can exceed the low and insecure daily or weekly budgets of the poor[12].

Evidence of the widespread use of such coping mechanisms in response to malaria episodes has been observed both within and outside Africa, and ignoring their implications can lead to misleading conclusions on the impact of disease. On one hand ignoring any adjustments households make to mitigate the impact for example by reallocating labour may over estimate the true burden. On the other hand, ignoring the knock-on effects of coping mechanisms such as selling assets or withdrawing children from school to replace sick workers, may under-estimate the true cost[20].

Coping strategies could be categorized into those that prevent costs (non-treatment) and those that manage or cope with costs[12].

- **Strategies To Cope With The Direct Costs Of Illness**: The strategies adopted in sequence by households to minimize the risks to livelihood

sustainability are: using savings; pawning jewellery; borrowing or making claims from social networks; selling food stores; reducing consumption of non-essentials and then more essential items; diversifying income sources; selling unproductive assets; reducing investments (e.g. withdrawing a child from school); selling productive assets such as livestock, land or machinery[12, 20].

- **Effects of Coping Mechanisms:** Strategies for coping with financial expenditure on treatment and prevention may have knock-on effects through depleted capital stock, lost savings and ineptness, which are not incorporated within a simple direct costing methodology. The sale of assets such as livestock potentially jeopardizes the household asset base with households emerging more vulnerable and less able to cope with further crises. A household without livestock and unable to rely on gifts may be forced to take out loans which could lead to serious debt and future impoverishment. These knock-on effects ultimately affect supply or production through low saving and investment. Furthermore this means that the casual relationship by which malaria affects the economy may not necessarily be through sick labour only, but also through lost capital and purchasing power[12, 20].

1.6.6.Differences in Direct Costs across Settings:

Direct illness costs are difficult to compare across studies[4,12]. There are substantial variations across settings in these costs. Below are some of the factors that are responsible for these differences in cost estimates:

Inclusion and exclusion criteria: The health burden of malaria is difficult to define and measure[20]. There are notable differences in the inclusion and exclusion criteria bounding the studies. A key difference is whether confirmed cases of malaria are the basis for responses or not. Some studies focus on confirmed cases with blood tests, therefore ignoring all

those people who do not attend official treatment sources, thus underestimating the cost[4].

Other studies use clinical judgment based on reports of symptoms through self diagnosis or facility- based reports of febrile episodes which may overestimate the burden[4,20]. However, the argument here is that the majority of people living in the malaria endemic areas are experienced enough to perform reliable self diagnosis.[3,4,25,27]. In addition to that, in an endemic area, the threshold level of parasitaemia attributable to malaria is very difficult to determine since this varies a lot according to patient's age and other characteristics[3]. Moreover, excluding non confirmed cases for the purpose of costing is not possible in many situations, as diagnostic tests are rarely used in peripheral health facilities and informal private outlets, and never at home[20].

Health System Characteristics:

Levels of expenditure on different medical and non-medical (e.g. transport) items vary according to the health system characteristics in different study settings, for example whether user fees are charged at government facilities, the extent of insurance coverage, and service accessibility, availability and quality, all are responsible for these differences in costs[12,20].

Scope of Direct Cost:

Which cost components are included for the final estimation also causes differences in results[14]. For example all studies measure medical costs but some ignore non-medical costs such as transport costs[28].

Different Units of Analysis:

Studies have also used different units of analysis, with some measuring individual costs and others household costs (including the patient and caregiver). This is responsible for comparative difficulties, for example

some papers express costs per episode, others cost per month or year, and others by per capita household spending or total household spending[28].

Illness-Related Beliefs:

These in addition to willingness of households to spend money on prevention methods and treatment at different types of provider, also causes differences in estimates[28].

Socioeconomic Status of Households:

Household income and ability to pay for treatment or prevention specifically causes differences in results within the same setting[20,28].

Endemicity:

Results of studies show considerable variation, because the burden caused by malarial morbidity and mortality is highly dependent on the endemicity of the disease and the species of parasite involved[14,20]. Comparisons of the economic effects of areas of unstable malaria with areas of stable malaria partially accounts for the apparent inconsistently in the economic impact of malaria upon households[7].

Timing of the Survey:

Whether the survey is conducted during the transmission or other seasons affects comparability even within one setting[20].

The Methodology Used:

Whether a HCM or WTP approach is used for measuring the direct costs, in addition to the way the data are collected are major factors in causing differences in estimates[14].

Coping:

A significant factor in calculating the economic burden that the disease places on households is the availability of household coping mechanisms. Households may be forced to borrow or sell assets in order to secure the fund for malaria treatment; this may lead to underestimation of the true impact falling on them[14].

1.7 1.7. Factors Affecting Household's Expenditure on Malaria Prevention and Treatment:

The literature highlights a large number of possible determinants for the level of prevention and treatment expenditures for malaria[13]. The following factors are some of the factors that affect the level of expenditure within the same setting:

- Prevention practices[29].
- Care seeking beaviour during a malaria episode [29].
- Socioeconomic status[29].
- Physical location of the households.
- Coverage by health insurance.

1.7.1.Prevention Practices:

Households use a range of preventive measures such as mosquito coils, aerosol sprays, bed nets, and mosquito repellents to differing degrees in different areas[20]. The level of expenditure on malaria prevention can be affected by the extent to which households use preventive measures, the uptake of preventive measure in turn is dependent on such factors as; epidemiological situations, socioeconomic status, availability and accessibility to preventive methods, illness related beliefs, physical location of the households sampled, and the level of education[13,20,29.] Generally speaking preventive measure uptake against malaria was noticed to be very low. The World Health Organization (WHO) estimated that less than 10% of the at risk children and pregnant women in Africa regularly sleep under an Insecticide Treated Net (ITN)[30,31]. Consequently in malaria endemic countries expenditure on prevention is highly skewed, because only small number of households expending any money on preventive measures[20].

Various social behaviour and economic barriers to prevention uptake have been identified, lack of information about the benefits of preventive measures such as ITN, poor access to markets of preventive methods, low income, price of methods, lack of interest and low prioretization[22,32]. Households would spend a great deal on malaria treatment rather than on protection[30].

1.7.2.Care Seeking Behaviour:

The duration of malaria attack and hence the consequences including the economic impact depend -among other factors- on the availability, prompt seeking, obtaining and administration of effective treatment[7,21,25]**.** The care seeking pattern affects the level of treatment expenditure through, the action taken by the patients during a malaria episode, and the type of health care facility used for malaria management.

First: The Action Taken By the Patients during a Malaria Episode:

During a malaria episode, a patient can choose from three categories: traditional practitioners, officials sector and self treatment[27]. These categories are not mutually exclusive[13,14,27].

Delay in Seeking Treatment For Malaria:

Not only do the source of treatment matters but also whether the action is taken promptly or not. Many studies have reported delays of many days among those who seek care before presentation[26]. In Uganda 38% of those who presented at a health center had symptoms for more than a week, in Guinea, and Thailand approximately half began some treatment on the first day of symptoms[27].In Togo only 17% of those taken to health center were brought on the first day[27].

With respect to reasons for delays, some have suggested that delays can be attributed to economic considerations such as time lost from work and

cost of medications, Even when treatment in a health center is free, individuals may incur costs for transportation[26, 33].

There is also evidence that delays are related to difficulty in accessing the official sector[26,27]. For example in Guinea West Africa delays in taking a child to a health care worker were shorter in urban areas than in rural areas, which reflects high accessibility in urban areas.

Delays affect the level of expenditure, when patients delay considerably for the disease to be serious, necessitating higher cost for its cure[21].

Self Treatment:

Self-treatment with antimalarials is reported to be widespread in malaria endemic countries. It was estimated that more than half of the world's antimlarials are consumed outside the public health sector[26].The proportion who self treat or buy drugs is high, although there is considerable variations. Self-treatment ranged from 1-94% with 44% of the rates above 50%[27].

Financial cost and access were sited as reasons for resorting to self treatment[13].However, most people chose self treatment for malaria because they were familiar with the disease and felt confident in their ability to treat themselves[13,27].

In addition to that the ease of obtaining drugs from pharmacies encouraged self treatment[34]. Regarding the types of drugs used for self treatment, some studies reported that most of the treatment obtained from shops were antimalarials , however in other cases as in Kenya only 49% of the drugs obtained from retail outlets to treats malaria cases in children were antimalrials[27].

Self treatment is associated with the least average cost per malaria case[13,27,35]. In an urban survey in Cameroon self treatment with antimalarials purchased in shops was associated with the least expenditure[27,35].

Traditional Treatment:

This includes reports of use of traditional remedies or visits to traditional practitioners. Most studies reported 10% or less use of traditional healers[27].

Traditional healers were not considered important in the treatment of malaria, sometimes because they did not claim to cure it or because the people already knew how to treat malaria by traditional and modern medicine[27,34,36].

Traditional treatment is also associated with low malaria treatment expenditure per case[13, 27].

Uses of Official System:

The official sector was defined broadly to include reports of the use of hospitals, clinics, dispensaries, private practitioners and village health workers[27]. There are considerable variations between studies in the proportion that use the official health sector. With a range of 10-99% , just over halve 54% of rates were above 50%[27]. Seeking treatment for malaria at health facilities was found to incur the greatest out of pocket expenditure[13,27,22,33]. One study reported that treatment at a dispensary was 2.6times higher than self treatment and hospital treatment was 10 times higher than self treatment[27].

Malaria expenditure also varies by the type of health facility used for treatment. The rate of utilization of private health facilities was usually low compared to public facilities[26,33]. In Sri Lanka only 25% of the patients sought care from the private sector, while 46% of them went to public facilities[4].

Private health facilities are associated with higher out of pocket expenditure than public facilities[26,33]. Ali et al(1998) had shown that, cases treated at the private sector had a cost per case higher than those treated at governmental facilities in Wad Medani, Gezira State[23]. In

Guyana Coast Booth and Maclean (2001), showed that the average treatment expenditure per case was US$0.96 for those who sought treatment from public facilities and US$ 13.74 per case for those who went to private facilities[26]**.** In Matale area in Indonesia Attanayake et al (2000) had concluded that patients who had received treatment only from private western sources had the highest average cost of treatment[4].

Compliance with Malaria Treatment:

In almost all of the reports that mentioned dosage, under dosage was the most prevalent pattern. Failure to complete a full course of treatment is common whether antimalarials are obtained from health care providers or in the unofficial sector. A number of studies noted that under dosing is common, exceptions were noted in Sri Lanka where 90% reported full compliance[27], Guatemala where compliance rate was 80% , Ethiopia with compliance rate of 93%[26], and in the Philippines with a compliance rate of 75% among children[38].

In Kenya 55% of those seen at a health care center did not follow instructions[27].In Zimbabwe 27% stopped taking the medication when they recovered and saved the tablets. In Congo 33% underdosed while 20% overdosed. In Guatemala only 10% of a surveyed population estimated a correct dose. In Zambia 28% - 39% estimated a correct dose for adults while only 25-28% did so for child[27].

Factors that are associated with high levels of compliance are good level of knowledge of the population and the provision of treatment free of charge at health facilities[26].

Non compliance with antimalarial has been found to be related to four factors: adverse effects, early resolution of symptoms, saving of drugs for future use, and inadequate dosing instructions[26].

Non-compliance effect on cost can be through the impact of misuse of antimalaral drugs and thereby the promotion of resistance to cheap drugs, necessitating the shift towards more potent and expensive drugs or combination therapies, both will increase the cost to be incurred by households[27].

Determinants of Care Seeking:

The factors that determine the pattern of care seeking during a malaria episode and thereby the level of expenditure can be summarized as follows:

Cost of Service:

Costs of services are the most significant determinants of health care utilization and the poor are more cost sensitive[13,33,35,39,40]. In several African countries the introduction of user fees in the health sector decreased health services utilization[35]. Although chloroquine is not expensive the total cost of seeking malaria treatment appeared to preclude a large number of people from attending health care facilities at the onset of the disease[21]. Consequently people had developed coping strategies, which had likely affected their behaviour towards disease management[3].

Geographical Accessibility: distance to health services and availability of means of transportation were identified as determinants of utilization of services[13,21,35,39,40]. This may be behind the observation that use of the official health sector was much higher in urban than rural areas (69-vs 33%)[27].

Socioeconomic Status of the Household:

Characteristics of households that influence choice includes household wealth and affordability,[6,29,35,39]. Both are significant determinant of choice of treatment source. Both increasing the utilization of health services[13,41]. In Guatemala hypothetical scenarios in which families had no available cash, they were more likely to generate choices of herbs,

folk's healers village health workers and health posts rather than private practitioners. Whereas in Philippines financial reasons were found to be a cause of failure to seek health care[27].

Quality of Care: quality of care affects more the choice between facilities, for example, drug shortages at public facilities, in addition to long waiting times were the main reasons for choosing private sector clinics over public ones[13,15,35].

1.7.3.Socioeconomic Status:

Awareness is increasing of the importance of development efforts that not only improve the overall burden of disease, but also measure the proportion of this burden borne by poor people and the difference in burden between rich and poor. The aim of these efforts is to work towards keeping inequity to a minimum[38]. It should be noted here, that health inequities occur at many levels: between regions of the world, between countries in regions, between provinces or states in countries, between districts, towns, or cities in provinces, and between social groups[38].

There is evidence that incidence of ill-health in general was higher among the poor than the rich[13], and that low-income families are more likely to have health problem either because poverty contributes to poor health or because poor health reduces income[42].

So it should be anticipated that the poor households will incur higher expenditure related to malaria because a higher burden of the disease falls on them compared to rich households. However, although there is evidence that malaria is a disease that primarily affects poorer countries, the evidence regarding the distribution of malaria incidence between poor and less poor population groups or households on a smaller (micro) scale is mixed and often contradictory[13].

Most studies that use material assets as a proxy for socioeconomic status have failed to establish a positive relationship between asset ownership and reduced incidence of febrile episodes (as a proxy for malaria) at the household level[13,25,28,35,38].

However, the evidence with regard to consequences of malaria, such as severe illness or mortality, by groups of lower socioeconomic status is more consistent. This does show that poor people suffer more serious consequences due to lower access to effective means of treatment once infected[7,34,35,38,42], and so there are likely to be mortality differences arising from this differential access to effective treatment[35].

The lack of consistent socio-economic differentials in malaria incidence is not necessarily counterintuitive given the epidemiology of malaria transmission. Vulnerability to the consequences of infection, on the other hand, has much less to do with non-discriminatory environmental factors, and more to do with inequities in access to prevention and treatment[13].

Some authors argue that the lack of difference in malaria incidence between different socioeconomic groups can be due to the fact that there is insufficient variation in socio-economic status in some areas to allow significant differences to be detected[13].

They also mentioned that if education is taken to be closely related to income, it is possibly that the propensity of over –reporting symptoms could justify this finding of no difference between socioeconomic subgroups, some authors also suggest that, this over reporting of cases by the rich is counterbalanced by under reporting by the poor[13,43]. Some studies suggested that illness perception both in terms of the frequency and severity of illnesses dropped significantly by lack of cash[33], and households in the lower economic category did not take symptoms as seriously as higher category since the patient had to pay for the use of any type of treatment.[3] Finally, another explanation is that because

households in the upper social category were able to pay treatment costs, less caution was given to the prevention of malaria, and their attitude towards health is more hazardous, thus increasing the incidence among them[3,43].

On the other hand other studies suggested different results, showing that the prevalence of parasitaemia or fever decline significantly with increasing socioeconomic status[3,13,19]. However in some of the studies that indicated differences in malaria incidence by various socio-economic proxies, many of these differences did not survive multivariate statistical analyses[13].

Socioeconomic Status and Prevention of Malaria:

The authors found that one of the key determinants of expenditure on preventive measures was income.[13,27,39,44,45].

The evidence suggests that the poor are less likely to use preventive measures, especially the most effective ones. They are also less likely to use preventive methods in the most effective or appropriate manner[13,34,36,43,45]**.** Households from low socioeconomic status had more pressing daily problems than mosquito or fever, and at times of cash unavailability, loans are usually taken for urgent malaria treatment than for protective measures**[45].**

One study in Malawi found that only 4% of the very low income houses spend money on malaria prevention as opposed to 16% of other households[13,27].

Many studies suggested that poverty was the most important barrier to net use[13].

Effect of Socioeconomic Status on Prevention Expenditure:

The level of expenditure on prevention methods is positively correlated with income, wealth or other proxy measures of socioeconomic status such as education and occupation. A study in Malawi found that expenditure on malaria prevention was positively correlated with income[13].

However when the poor do choose to invest in malaria prevention, they suffer a greater relative burden of this expenditure (in terms of the share of total household expenditure) and its opportunity cost[13]. In Malawi the estimated annual expenditure on prevention ranged from $0.59, or 0.9% of annual income in very low income households to $4.70, or 0.5% of annual income in low to high income households[13].

Socioeconomic Status and Care Seeking Behaviour:

Generally, treatment seeking behaviour and choice of treatment options differ between individuals of different socioeconomic status[13,15]. Those of lower socioeconomic status may be more likely to resort to self treatment or seek care from traditional providers than other quintiles and to use health facilities less frequently than other quintiles, and generally they receive cheaper (possibly inferior) treatment or no treatment at all.[13, 28,33,35,38,39].

Individuals in the richest income quintile are more likely to seek treatment for fever compared to those in the poorest quintile, also they are more likely to seek care (for any illness) from health facilities (compared with self-treatment or a traditional healer) they are also more likely to use "appropriate" drugs (defined as drugs to which resistance had not developed Fansidar mainly) compared to poor income quintiles[13,27,35,38,44].

In contrast to the results reported above, it was found that in Malawi treatment source patterns (for adults and children) were very similar for high and low income groups with approximately equal proportions of high and low income groups using traditional healers, hospitals and drugs from non-health centre sources[13]. Also in Philippines no impact of income was found on demand of health care[43].

Effect of Socioeconomic Status on Treatment related Expenditure:

- **First: On Absolute Terms:**

As with prevention expenditure, authors noted that an increase in income is associated with an increase in treatment expenditure[13]. In absolute terms the poor households expend less amount of money compared to less poor households[7]. The poor in general spend less on treatment than other income groups due to lack of access and inability to pay[28].

On the other hand, other studies found little difference in expenditure to treat malaria[13].

- **Second: On Relative Terms**:

Evidence showed that the direct costs of health care are regressive, imposing a greater burden (in terms of % of income) on poor families than on better-off families[14,28,46]. In absolute terms the amount is less for poor households, but the percentage is the same as or higher than for the rich households[7,15].

The likelihood of spending a high share of income on out of pocket costs drops as income raises .This is not surprising: If two families with different incomes spend the same amount for medical care, the family with the lower income will have spent a higher share[42]. This thus proves that, the burden of malaria treatment expenditure and thereby economic

consequences are likely to be greater for poorer than less poor households[13].

In Malawi, it was found that the overall direct expenditure on treatment of malaria illness constituted 28% of annual income among very low-income households and 2% of annual income among low to high-income households despite similar levels of expenditure[6,28]. 64% and 29% of households income was spent by poorest quintile in Kenya and Tanzania respectively on a typical illness episodes compared to 1% for the high income group in both countries[7].

The positive correlation between income and expenditure was stronger for expenditure on preventive measures than on treatment. It was concluded that more variables influenced prevention practices than influenced average treatment expenditure for febrile illness because the nature of illness is the principal determinant of expenditure on a particular illness episode[13,14,46].

1.7.4.Health Insurance:

Health insurance schemes are supposed to achieve financial risk pooling[47], and reduce unforeseeable or unaffordable health care costs through calculable and regularly paid premiums[46]. These schemes insure that health payments are not made at the point of service, can be anticipated in advance, and are not normally related to an individual's health status or service use[33,47].

The trade-off between expanding coverage and assuring adequacy is a difficult one. Health insurance serves two functions: it can promote access to medical care and it can protect families against catastrophic financial losses[42]. In settings where user fees are charged, out-of-pocket expenses are likely to be higher than where treatment is free at the point of delivery[28].

In the absence of health insurance, expenditures on health care are wholly borne by individuals, their households or their families[21]. Even small costs for common illnesses can be financially disastrous for poor households with no insurance cover[(47)].

The strong relation between the proportion of households with catastrophic health expenditures and the share of out-of-pocket payments in total health expenditure supports the hypothesis that prepayment and risk pooling can protect households from facing catastrophic financial consequences of illness[(47,48)]. Not surprisingly, the likelihood that a family will devote a high share of income to direct medical costs depends on, income, insurance coverage and the type of health insurance[(15,42)].

In Thailand, lower income households without health benefits cover faced high out of pocket expenditure relative to their income; households who lacked health benefit coverage spent out of pocket as much as 5-6% of their income on health acre, whereas other groups spent 1-2%[(15)].

The effect of health insurance on access to medical care[(35,42)], through removal of financial barriers to access could be supported by the finding by Pannarunothal and Mills(1997) in that there was a significant difference in reported cases between the uncovered group and the covered group in Thailand[(15)]. Also Meer, and Rosen(2004) had shown that once simultaneity is taken into account, the impact of health insurance upon the use of a variety of health care services increases[(48)].

1.7.5.Residential Area: Rural Versus Urban:

Prevention Related Expenditure:

Zone of residence (rural or urban) seems to be an important determinant or proxy for use and appropriate use of preventive methods[(13)].

It was found that chemoprophylaxis was used less regularly in rural compared to urban areas. The data also showed that rural residents were

significantly more likely to use medicinal plants rather than chloroquine chemoprophylaxis as a preventive measure (40% in rural compared to 10% in urban) and were more likely to burn leaves rather than use coils or sprays5. In Burkina Faso (Guiguemde, found that expenditure on malaria preventing was high in urban areas compared to rural areas, despite the increasing incidence in the rural areas[24]. In Benin prevention spending was found to comprise 1.6% and 2.1% of annual incomes of urban and rural residents respectively[22].

Malaria Incidence: Urban Versus Rural:

Rural locations appear to experience higher rates of transmission[13,27,22], and can be associated with increased malaria risk for epidemiological reasons. Similarly, urban residence can be accompanied by potentially protective socio-economic factors against malaria risk such as education and income . In Malawi, the results of one study revealed rural residence as the highest risk factor for parasitaemia in children under five years of age, even after controlling for bed net use. Similar results were found in Benin, where rural children had significantly more annual febrile episodes (1.93 vs. 0.34) and illness episodes (2.05 vs. 0.40) than urban[13], despite that, results from Malawi showed that treated nets are twice as common in urban (56%) as in rural (28%) areas. Further evidence from social marketing activities in Malawi revealed that overall net ownership was around 20%, but urban net ownership was much higher (28.8%) than rural net ownership (6.4%)[13].

Care Seeking Behaviour: Urban Versus Rural:

Mothers in urban areas were much more likely to have taken their children for treatment and have used antimalarials[27]. Evidence also suggested that, urban mothers are more likely to contact a private facility,

and less likely to contact a government facility than urban mothers[13]. Rural inhabitants had significantly higher preferences for traditional medicine and lower preference for modern methods than the larger town[27].

Treatment Expenditure:

Regarding differences in treatment expenditure, it was found that there was high treatment related cost per case in urban than in rural areas, this was most probably due to such factors as: higher incomes in urban areas, the presence of more expensive survives in urban settings in addition to the high accessibility to health care[22]. In Benin total treatment expenditure accounted for a slightly higher proportion of annual household income in rural (3.3%) compared to urban (2.4%) households[13].

Also it was found that annual expenditure on self-medication with chloroquine was significantly higher in rural (US$0.44) compared to urban areas (US$0.08), as was expenditure on traditional treatment. Expenses for private consultation, on the other hand, were significantly higher in urban areas and the proportion of total treatment costs accounted for by private consultation were 11% of rural and 48% of urban total treatment expenditure[13].

While rural – urban differences are striking for some studies it is not possible to determine the extend to which they reflect difference in educational level, income and access to service[27].

1.8. JUSTIFICATION

This study – by estimating the household expenditure on malaria prevention and treatment, will serve two purposes:

First: It will provide policy makers in the health sector with information, on the total costs borne by households, and the differential impact on population subgroups and regions. In addition to that it can help identify populations' practices to avoid mosquitoes, and will also give a clue to the pattern of health care seeking behaviour of the population during malaria episodes. All this is required to help the planning process and facilitate the identification of packages of interventions that can be targeted efficiently and equitably to those who are most at risk of adverse economic effects.

Second: If included in health education messages, directed to the public, the information about how much they spend on malaria treatment is anticipated to increase the level of their participation and uptake of the preventive measures, and may also influence their care seeking behaviour, and help them in making a choice about alternative providers of malaria treatment.

1.9. OBJECTIVES

1.8 General Objectives:

To estimate the out of pocket expenditure related to malaria by households, in Khartoum State, during the transmission season 2003.

1.9 Specific Objectives:

1. To estimate the monthly out-of-pocket monthly expenditure for treatment of simple malaria by households in Khartoum state 2003 during a transmission season.
2. To estimate the annual out-of-pocket expenditure on malaria prevention by households, in Khartoum State, 2003.
3. To identify the effect of the following factors on malaria related expenditure by households in Khartoum State 2003:
    - Residential area
    - Health insurance.
    - Socioeconomic status.
    - Care seeking behaviour

CHAPTER TWO

2. MATERIAL AND METHODS

1.10 2.1. Study Design:

This study is a descriptive, cross-sectional, comparative, community based study

1.11 2.2. Study Area:

Khartoum State:

Khartoum State is the smallest state in Sudan with a total area of 28000klm^2. Population of Khartoum State is estimated at about 5,302,000 with an annual growth rate 4.04[49].

42.4% of Khartoum population is economically active, while the unemployment rate is 13.5%, 67.8% of the males are economically active and 13.4% of the females are economically active[49].

A study conducted during December 2002 showed that 19.6 % of the population was employed by the public sector, while 37.2% were self-employed, 9%were laborers and 15% were not working [50].

The details of the health facilities that provide curative health services are shown in the table below[49].

Health facility	Number
Governmental hospitals	45
Private hospitals	46
Health centers	141
Dispensaries	159
NGOs health centers	222

Private clinics and privet laboratories are not included. Governmental health centers and / or dispensaries represent the primary care level in urban and rural areas, while health services are provided exclusively by Non Governmental Organizations in camps[51].

Malaria in the state is man-made malaria as identified by the routine inspection of potential breeding sites.[11]

- In urban (and semi urban) (68.6%of the population) malaria transmission occurs all through the year with two seasons of high transmission. Broken pipes, small farms at the river banks, water tanks in building under construction, and indoor sites are the main breeding sites in urban areas.
- Rural areas (19% of population) population live around the agriculture schemes, which represents the main source for mosquito breading, the transmission increases during winter.
- Camps situated at the out skirts and other parts of the state, these areas are characterized by favorable conditions for mosquito breading, due to inadequate drainage of rain water[51] collections of water and water pools at the sites of public water sources. Two camps were included in the study , these are:
- Ahmed Elradi Jabir (Omdurman Es Salaam Camp): located along the southwest edge of Omdurman.
- Pantio (Jebel Aulia camp) located in the southeast of Khartoum; it is occupied by war affected populations from Nuba Mountains and South of Sudan. It is adjacent to Sundos agriculture scheme.

The prevalence of malaria differs from one residential area to the other (rural urban and camps)[11], however, since only the difference in expenditure per fully treated malaria case was elicited the difference in prevalence will have little, if any, effect on expenditure variations.

1.12 2.3. Study Population:

Households in Khartoum State.

Household definition: is a group of individuals living in the same house, eating from the same pot, with a unique economic decision-making center, which means that they depend on the same budget.

1.13 2.4. Sample:

1.5.3. Sample Frame:

Households in Khartoum State.

1.5.4. Sample Size:

For the households the sample size was calculated using the following formula:

n = z2 pq /d2

Where: n = sample size

z= confidence level (1.96)

p= 0 .5

q= 0.5

d= desired margin of error (0.05)

Thus the sample size was calculated to be = (1.96) (1.96) (0.5) (0.5)/(.0025) = 384 X 2 (design effect) = 786 households. 17% of the calculated sample size was added to guard for non-response. Thus the sample size was of 900 households.

1.5.5. Sample selection:

Households were selected using the stratified, cluster sampling technique. The whole State was divided into three strata urban, rural and the camps: this stratification was based on the classification of the Central Bureau of Statistics of Khartoum State.

The sample size was divided between the strata according to the population size in each, the strata were further divided into 24 clusters (wards in urban areas, villages in rural areas and camps), and these were selected according to the probability proportional to size technnique. At the level of each cluster, 37 households were selected using the systematic random sampling technique.

1.14 2.5. Tools of Data Collection:

From the households data were collected by two pre-structured, pre-tested questionnaires adapted and modified from the Sri Lanka study[4]. The respondents were the housewives. However, the nature of the data sought allowed other family members also to assist in filling the questionnaire. Data were collected during October 2003.

1.15 2.6. Variables:

Questionnaire (1) for the use of malaria preventive measures and the cost of malaria prevention during the year prior to the date of data collection, it included questions for: (see annex)

- Background information.
- Use and expenditure of preventive measures against malaria.

Questionnaire (2) for malaria episodes during the previous month (September 2003): (see annex)

- Background information of malaria cases.
- Health insurance coverage.
- Care seeking behaviour.
- Expenditure on malaria treatment:

Malaria case definition:

The National Guidelines for Malaria Treatment[52] defines a case of malaria as: "occurrence of fever and other suggestive symptoms with

observation of the trohpozoite in peripheral blood. In case of lack of laboratory facilities and if there is fever malaria could be diagnosed on clinical basis after excluding other causes of fever like tonsillitis, chest infection, urinary tract infection, autitis media , and viral infection."

For this study all those reported being diagnosed by a positive blood test or diagnosed on clinical basis at a health facility were included. For reported cases where the diagnosis was not confirmed (self-diagnosis) the diagnosis was validated at the time of data collection by excluding the following symptoms: cough, burning micturtion, ear pain and sore throat. An individual was considered as having two or more malaria episodes if a minimum period of two weeks had lapsed between the two episodes. In this instance all episodes will included.

1.16 2.7. Calculation of Direct Costs:

The cost-of-illness method was used to calculate the out-of-pocket expenditure.

-Prevention related expenditure: prevention related expenditure was calculated by adding expenditure on the following items during the year prior to the time of data collection:

Bed nets, impregnated bed nets, house residual spraying, larviciding activities, aerosol sprays, mosquito repellents and screening of windows.

Then the sum was divided by the total number of households included in the study to obtain the average expenditure per household.

-Treatment related expenditure: for all malaria episodes during September 2003 treatment related expenditure was calculated by adding expenditures on the following items: transportations for the health facility and / or the pharmacy, doctor fees, laboratory investigations, drugs, traditional treatment, special food, and any other related expenditure. The sum was divided by the total number of household to obtain the monthly average

per household, it was divided again by total number of fully treated malaria episodes to obtain the expenditure per fully treated case.

1.17 2.8. Data Analysis:

Data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) programme.

Descriptive statistics were used to calculate the frequencies and the average values, percentages were used to express the values for the qualitative variables. The averages for quantitative variables were expressed in the mean (standard deviation). The median was also used when the distribution of values was positively skewed.

For the qualitative data chai Square test was used to compare between sub groups. For the quantitative data the t test and one way ANOVA test were used to compare between the sub groups, the log of the original data was used when the skewedness of the data was more than 3. Multivariate analysis was performed to identify the determinants of prevention and treatment expenditures. p values of less than 0.05 were considered statistically significant.

1.18 2.9. Limitation of the study:

The study depended on respondent's recalls about malaria episodes that may not be confirmed by blood investigations, although this may overestimate the burden, excluding non-confirmed cases for the purpose of costing is not possible in many situations, as diagnostic tests are rarely used in peripheral health facilities and never at home[20]. And thus a lot of cases of genuine malaria will be missed. Vosti (1990) had mentioned that[25]:

> In judging the relative merits of malaria measures based on laboratory tests and those derived from questionnaire responses, researchers must specify exactly what they are trying to measure. If researchers are

> interested in the economic consequences of the physical effects produced by an attack of malaria, regardless of the uniqueness of the infection or its exact definition, then verbal responses to questionnaires can be sufficient.

Vosti (1990) proved this assumption true during a study to estimate the costs of malaria among gold miners in Brazil[25].

CHAPTER THREE

3. RESULTS

904 households were surveyed in Khartoum State, during October 2003. The respondents were the housewives; however, whoever was present from the family members at the interview time, was allowed to participate in providing the needed data. Table (1) provides the characteristics of the households; 74.2% of these were from urban areas, 17.3% of them were from rural areas, and 8.5%of them were from camps. Regarding the educational level it was found that 23.9% of the heads of households were illiterate, 23.2% had primary education, 10.3% had intermediate level of education, 23.1% attained secondary education, 13.1% had university education, while the remaining 6.3% were distributed between khalwa, and post university level of education. 25.3%of the households were from East Nile area, 43.7% were from Omdurman area, and 31% were from Khartoum area. The mean family size was 6.7 (4.03).

The households were divided into 5 income groups using four cutoff points (percentiles), ranking from the highest to the lowest income group. The distribution was as follows:20% in the first group , 20.4% in the second group, 22.7% in the third group,21.1% in the fourth group and 15.7% in the fifth and the lowest income group(table 1).

The majority of the respondents (75.6%) claimed that during an episode of malaria they usually sought care from a health facility, 13.1% of them said they did blood investigation for malaria without consulting a health care provider, 4.9% said they self diagnosed and treated themselves, and .8% said they ignored the illness.

Only 39.4% of the respondents reported any use of preventive measures against malaria during the previous year (figure1).

Figure (2) shows the use of different preventive measures by the households, the most popular method used was the bed net. It was used

by 18.8% of the respondents, followed by residual spraying of houses, which was performed by 17.5%, impregnated bed nets and insecticide aerosol sprayers came next, and they were used by 8% and 8.4% respectively, 5.2% of households used mosquito repellents, while only 2.3% of the households were involved in any larvicidal activities. The least preventive method used was the screening of windows where only 2.3% of the households had their windows screened.

Households from the higher income groups reported using preventive measures against malaria significantly more than households from lower income groups (chi-square 25.3 – df 4 – p=0.000) . There is no significant difference in the uptake of prevention methods against malaria between households from different residential areas.

Almost half (49.2%) of the households reported malaria episodes during the previous month (September 2003) (figure3) giving an incidence of 9.1%. There was no significance difference between the five income groups in the probability of reporting malaria episodes during the previous month. Incidence in the highest income group was 9.3% and in the lowest income group it was 8.7%.

The probability of occurrence of malaria episodes was higher in households from rural areas and camps than in those from urban areas ($p< 0.05$). Incidence of malaria was 8.9% in urban areas compared to 10.4% in rural areas. The difference between residential areas as regards to malaria incidence was statistically significant (chi-square : 9 – df: 2 – p= 0.011).

In the surveyed households there were 513 reported malaria episodes during the previous month. Only 14.6% of the individuals with malaria episodes during the previous month were health insured by the Health Insurance Corporation, 5.8% of them had private health insurance mostly

from a private employer, while the rest 79.5% did not have any type of insurance coverage (Figure 4).

The distribution of malaria episodes according to the method of diagnosing malaria is shown in Figure (5). 67.1% of the reported malaria episodes were diagnosed by positive blood films, 20.9% of them were diagnosed on clinical basis at a health facility10.5% self diagnosed their condition, and 1.5% were diagnosed by a pharmacist. At the time of data collection, the diagnosis of those who were self diagnosed or diagnosed by a pharmacist was validated by asking about the accompanying symptoms, so of these only 38.8% probably had malaria, while the remaining 61.2% probably had other diseases which have symptoms resembling those of malaria, those comprise only7.4 % of the total reported malaria episodes.

The first action taken by 78.8% of the individuals with reported malaria episodes in response to their symptoms was to go to a health facility to seek diagnosis and treatment, 8.8% took self-treatment, 7.4% did blood investigation without consultation, 3.3% went to a traditional healer, while only 1.8% ignored the illness completely and took no action. (Figure 6)

The average period of delay before seeking care was 2.7days(2)

Of the 152 who delayed their action beyond the day of symptoms appearance, 57.9% waited to observe if the condition is self limited, 30.3% delayed their action because there was no money at the time of onset, 11.8% delayed for other reasons such as the absence of the head of the household.

The main reason for ignoring the illness for the majority (77.8%) of the nine persons who ignored the illness was the lack of money.

64.7%, of the 17 individuals who consulted traditional practitioners or took traditional remedies, said that the traditional treatment is more

effective than the medical treatment, while 29.4% resorted to this kind of treatment because it is cheaper than medical treatment, one person said it is cheaper and more effective than the medical treatment .

Of the 45 persons who took self treatment, 40% said resorting to self-treatment cut the costs of treatment, 37.8% said they knew that the disease was malaria, and there was no need for confirmation, 8.9% said that the health facility was far away, 13.3% did so for other causes.

The most used type of drug for self treatment was chloroquine tablets. It was used by 37.8% of those taking self treatment, followed by traditional remedy (17.8%), chloroquine injections and choloroquine syrup were taken by 11.1%, 8.9% took only antipyretics, 6.6% took fansidar, and the remaining subjects (6.7%) took combinations of drugs(Figure 7).

Most of drugs for self treatment (48.9%) were bought from pharmacies, 22.2% of the study population had the drugs or remedies stocked at their houses, 8.9% of drugs were given as gifts from relatives or friends and 20% were bought from shops (mainly the traditional remedies) .

Using the protocol of malaria treatment issued by the National Administration of malaria it was found that 61.1% of the 36 who took malaria treatment took a complete dose, 33.3% took incomplete dose, and 5.6% took more than the recommended dose (Figure 8).

57.9% of the 38 persons who did blood investigation with no consultation said they suspected malaria and wanted only to confirm, 31.6% said this would cut the costs of management, 10.5% did it for a combination of other different reasons.

92.1% of all those who did the blood investigation took self treatment, 43.1% took chloequine tablets, 52.8% took chloroquine injections, 17.1% took chloroquine syrup, 5.7% took tradtional remedy, artimether injections, fansidar tablets, and antipyretics were taken by 2.7% each.

For the 404 who went to a health facility, the governmental health centers were visited by 33%, followed by NGO health centers which were visited by 26.5%, governmental hospitals were visited by 23.3%, 14% went to private clinics, while 2% and 1.2% went to private hospitals and dispensaries respectively (Figure 9).

Cases from urban areas used private facilities significantly more than those from other residential areas, cases from camps used NGO health centers more and cases from rural areas used governmental facilities more (chi-square: 88.9 – df: 14 – p: 0.000).

Although cases from the highest income group used private facilities more than cases from the other income groups, the difference was not statistically significant.

For the 332 who went to governmental or NGO health facilities, 33.7%said they had chosen it because the cost of transportation to these facilities was low, 33.1% said it was the nearest to the house, 14.1 % said it provided inexpensive service, 6.6% went because they were assigned by the Health Insurance Corporation, 8.4% said these facilities were both the nearest to the house and the cheapest, 3.9% went for other reasons (Figure 10).

48% of the 72 who went to a private health facility, said it was because of the good quality of service provided at the private facilities, 25% said the cause was that the governmental health facility is far away, 15.1% said the working hours at the governmental health facilities were not convenient and the facilities were closed at the time they sought them, and 7% went for other reasons (Figure 11).

Of all the 404 who were treated at a health facility, the majority (94.8%) reported compliance to the health care providers instructions regarding drug regime , only 4% took part of the treatment or some of the drugs,

1.2% were still taking their medication at the time of interview (Figure 12).

For the 16 persons who did not comply with the treatment, 68.8% said it was because they had enough money only to buy part of the treatment, one patient said he stopped because of the side effects of the treatment, 25% stopped because the symptoms disappeared.

After taking the first action to treat malaria, 82.4% of all the 513 reported malaria episodes, were cured from their illness, 10.7% were not cured, and 6.8% were still on medication, this after taking the first action (Figure 13).

Of the 55 who were not cured 80% took further action (61.8% went to a health facility, 10.9% did blood investigation with no consultation, 7.3% took self treatment). The remaining 20% ignored their illness and took no further action (Figure 14).

Finally, after taking all the actions to treat malaria, and the time of the interview, 85.4% (438) of all the 513 reported malaria episodes were fully cured, 6.2% were not cured, and 8.4% were still on treatment (Figure 15).

The 438 fully cured reported episodes were further analyzed to calculate the cost of treatment per fully cured case, and to study the effect of care seeking behaviour, residential area, and health insurance on the treatment related expenditure.

46.8% of the individuals with malaria episodes used no transportation to reach their destination, either a health facility, a laboratory, a pharmacy or a traditional practitioner, while 53.2% used different means of transportation.

The mean annual expenditure on the different preventive measures used per household were as follows: mean annual expenditure on bed nets was 1740 SD (1434), the median was1200 SD; on residual house spraying it

was 1560 SD(2751), the median 500SD; on impregnated bed nets it was 1943 SD(1908), the median was 1050 SD; on insecticide aerosol sprayers it was 3102 SD(7461), the median was725 SD ; mosquito repellents it was 1475 SD(2133), the median was 600 SD; on larvicidal activities it was1513 SD(2843), the median was 200 SD; and on screening of windows it was 4666 SD(5052), the median was 3000 SD (Table 2).

Figure (16) shows the mean expenditure on preventive measures against malaria during last year per household in Khartoum State, and in different income groups. For the whole State the average expenditure was 2944 SD(5517) the median was 1400 SD.

In the different income groups the results were as follows:

Fifth(lowest income group)	1622.1591	1638.57226)
Fourth	2522.3684 SD	(6550.72409)
Third	1983.6207 SD	(1592.70232)
Second	2346.0000 SD	(2565.02937)
First(highest income group)	5661.2805 SD	(8909.41567)

There was positive correlation between income and preventive expenditure. In addition to that the average expenditure for malaria prevention in the highest income group was significantly higher (F: 6.3 – df: 4 p: 0.000 – CI for mean = 2458 – 3753.7) than that in the other four groups.

Comparing between different residential areas in the Khartoum State, the average expenditure for malaria prevention was estimated for the urban areas to be 3391 SD(6115), in the rural areas it was 2301 SD(3591), and in the camps it was 779 SD(464) (Figure 17). The average expenditure for malaria prevention in the urban households was significantly higher (F: 1.811 – df: 2 - $p<0.05$) than that in the camps. There is no significant difference between the urban and rural areas in prevention expenditure.

Figure (18) shows that there was significant difference (F: 1.814 – df: 8 – p:0.002) in the average annual expenditure on malaria prevention according to the educational level of the head of the household.

Figure (19) shows the average monthly expenditure for malaria treatment per household for Khartoum State, and by households from different income groups. The mean expenditure to treat malaria morbidity per household per month was found to be 2710 SD(2191) the median was 1100SD.

The average expenditure for the treatment of malaria in the five income groups was as follows:

Fifth (lowest income group)	1203.47149 SD	(1191)
Fourth	1217.70235 SD	(1180)
Third	1388.39764 SD	(1228)
Second	1792.27704 SD	(1512)
First (highest income group)	2710.41018 SD	(3456)

It was found that the two highest income groups had significantly higher ($p<0.05$) average expenditure than the other three lower income groups.

Figure (20) shows the mean average expenditure for treating malaria per fully cured patient in Khartoum State and according to coverage by health insurance. The average expenditure for the State was found to be 1391 SD (1334) median 1070 SD when including the nutrient foods and drinks the average expenditure was 1972 SD (2662) the median was 1300 SD.

The mean average expenditure per fully cured patient for those with the Health Insurance Corporation coverage was 1195 SD (1278), for those with private health insurance coverage it was 1521 SD(1724) and for those with no coverage it was 1423 SD(1317). Those who had the health insurance corporation coverage had a mean average expenditure significantly lower (F: 1.14 – df: 2 - $p<0.05$) than those with no coverage.

Figure (21) shows the average treatment expenditure per fully treated case in different residential areas. In urban areas the expenditure was 1569.9 (1445) SD, in rural areas it was 965.4 (937)SD and in camps it was 995.4 (651) SD. The expenditure per fully treated case was significantly higher in urban areas than in rural areas and camps.(F:9.084 – df:2 – p:0.000)

For those who took self treatment the mean average expenditure per fully cured patient was 327 SD (311), for those who did blood investigation with no consultation it was 1226 SD (978), for those who went to health facility it was 1433 SD (1307) , for those who went to a traditional practitioner it was 420 SD (362), and for those who did two actions it was 2122 SD (1856) (Figure 22).

Taking self treatment or going to a traditional healer had significantly lower mean expenditure per fully cured patient than all the other actions.

Doing blood investigation with no consultation or visiting a health care facility had a significantly lower direct cost per patient than doing two actions. Going to a traditional healer had the lowest direct cost per patient and taking two actions had the highest cost(F: 7.6 – df:4 – p: 0.000) (Figure 22).

For those who went to governmental hospital the average expenditure per fully cured patient was 1250 SD (913), for those who went to governmental health center it was 1090 SD (797), for those who went to a dispensary it was 686 SD (302), for those who went to NGO center it was 1176 SD (727), for those who went to a private clinic it was 3088 SD (2236) and for those who went to a private hospital it was 1850 SD (1228).

Going to governmental health facility (governmental hospital, governmental health center, or a dispensary) and NGO center the costs were significantly lower than the average treatment expenditure per fully

cured patient than going to a private clinic or doing two actions. The average treatment expenditure per fully cured patient was the highest for those who went for a private clinic, and was lowest for those who went to a dispensary(F: 23.27 – df:7 – p:0.000) (Figure 23).

Figure (24) shows the breakdown of the average expenditure per fully cured patient. Drugs came at the top of the list constituting 45.1% of the total average expenditure, consultation fees came next comprising 21.5%, followed by laboratory test costs which comprised 19.1%, transportation fares constituted 12.3%, and cost of traditional treatment constituted only 0.8%.

Table (3) shows that the cost of preventing malaria comprised 0.6% of the annual income of Khartoum population. In the 5th income group (lower income group) this costs of malaria prevention comprise 1.4% of their annual income. In the 4th income group the cost of preventing malaria comprised 1.1% of the annual income. In the 3rd income group the cost of preventing malaria comprised 0.6% of the annual income. In the 2nd income group the cost of malaria prevention comprised 0.5% of the annual income. In the 1st group the cost of malaria prevention comprised 0.4% of the annual income

The average expenditure on malaria treatment comprised 5.9% of the monthly income of Khartoum residents during the transmission season, while the average expenditure including the food comprised 5.1% of the monthly income.

In the 5th income group (lower income group) the average expenditure on malaria treatment comprised 12.8% of the monthly income and the average expenditure including special food comprised 14.9% of the monthly income. In the 4th income group the average expenditure on malaria treatment comprised 6.6% 0f the monthly income and the average

expenditure including those of food comprised 10.9% of the monthly income.

In the 3rd income group the average expenditure on malaria treatment comprised 4.7% of the monthly income and the average expenditure of treatment including those of food comprised 6.3% of the monthly income.

In the 2nd income group the average expenditure on malaria treatment comprised 6.6% of the monthly income and the average expenditure on malaria treatment including those of food comprised 6.2% of the monthly income.

In the 1st group the average expenditure on malaria treatment comprised 2.1% of the monthly income, and the average expenditure on malaria treatment including those of food comprised 2.8% of the monthly income (Table 3).

Table (4) shows the multiple regression coefficients for the average annual expenditure on malaria prevention only income groups and head of household educational level were found to be significant factors ($p< 0.05$).

Among the variables analyzed by multiple regression of the monthly average expenditure per fully cured case, several variables were found to be significant ($p<0.05$). These were income group, residential area, health insurance status and the first action taken by the patient (Table 5).

Figure 25 shows that the majority of malaria cases (92.7%) were fully cured after taking only one action, while 7.1% took 2 actions before they were fully cured.

Figure 26 shows that those who resorted to traditional treatment or self-treatment as their first action, were forced to take a second action significantly more than those who went to health facility (chi-square: 438 – df:8 – p:0.000).

Table (1). The characteristics of studied households – Khartoum State September 2003 (N = 904)

Level of education of head of household	Frequency	%
Illiterate	216	23.9
Adult education	14	1.5
Khalwa	36	4.0
Primary	210	23.2
Intermediate	93	10.3
Secondary	209	23.1
University	119	13.2
Post university	7	.8
Total	904	100.0
Residential area		
Urban		74.2
Rural		17.3
Camp		8.5
Total	904	100
Socioeconomic status		
First class (highest income)		20
Second class		20
Third class		22.7
Fourth class		21.1
Fifth class (lowest income)		15.7
Total	904	100

Figure (1). Distribution of households according to the use of preventive measures against malaria during the previous year- Khartoum State, September 2003 (N =904)

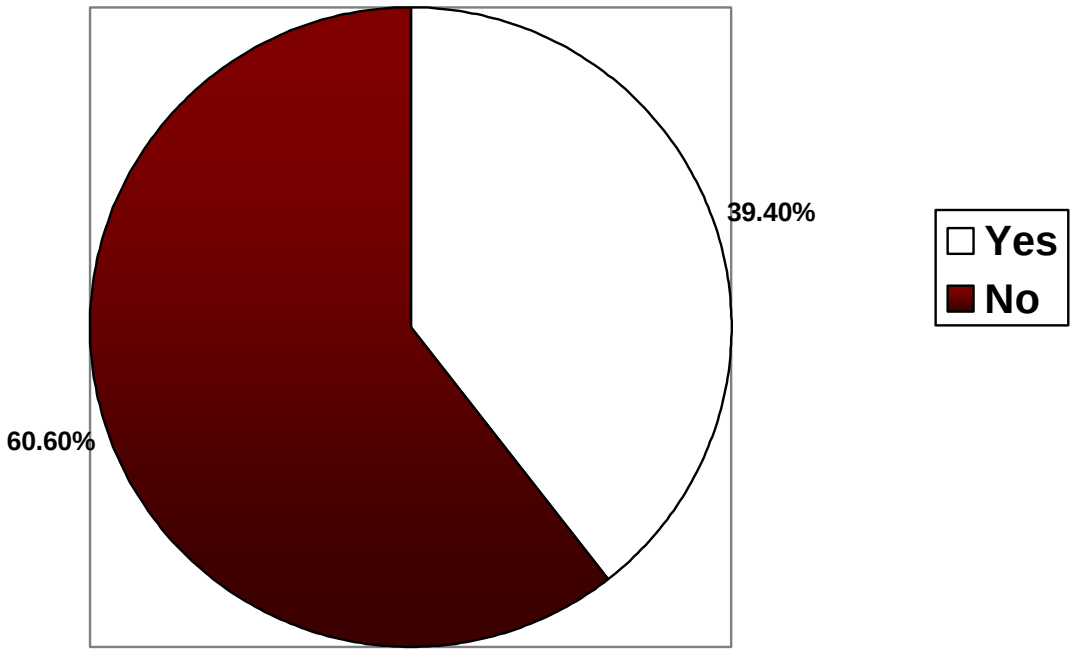


Figure (2). Different methods of malaria prevention used by households during the previous year, Khartoum State September 2003 N = 356

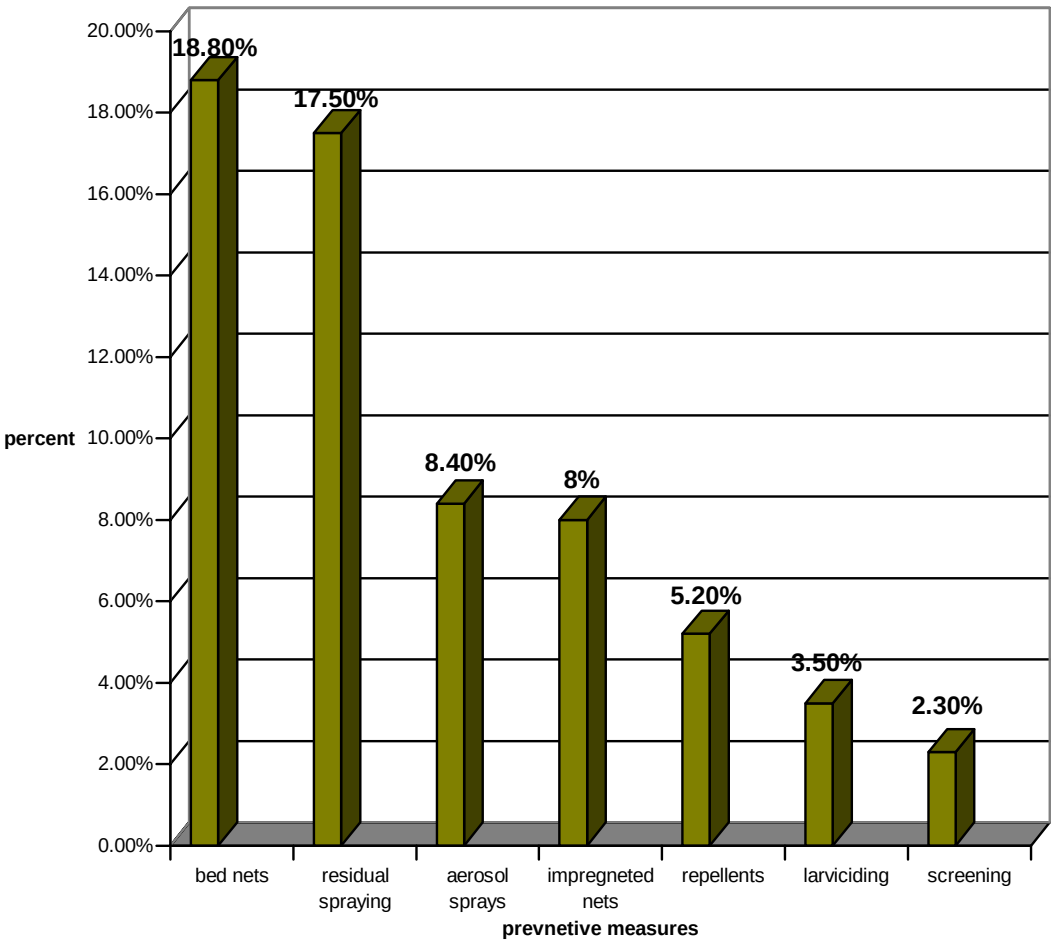


Figure (3). The occurrence of malaria episodes in the household during September 2003 - Khartoum State (N =904)

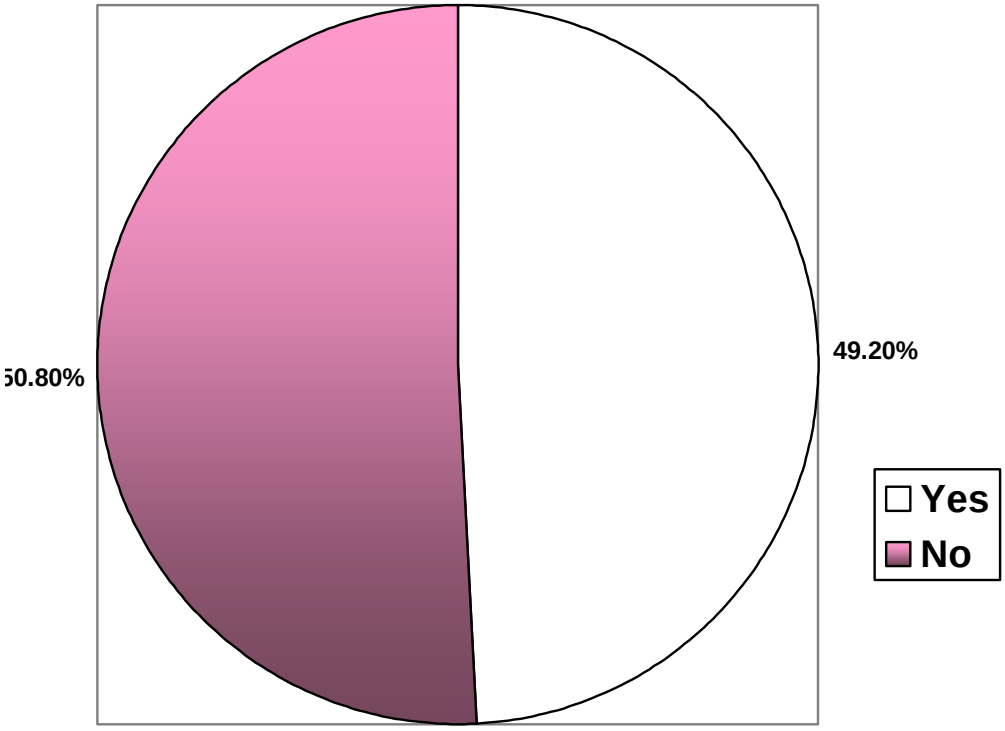


Figure (4). Coverage by health insurance for the individuals who suffered from malaria episodes during September 2003 - Khartoum State September 2003 (N =513)

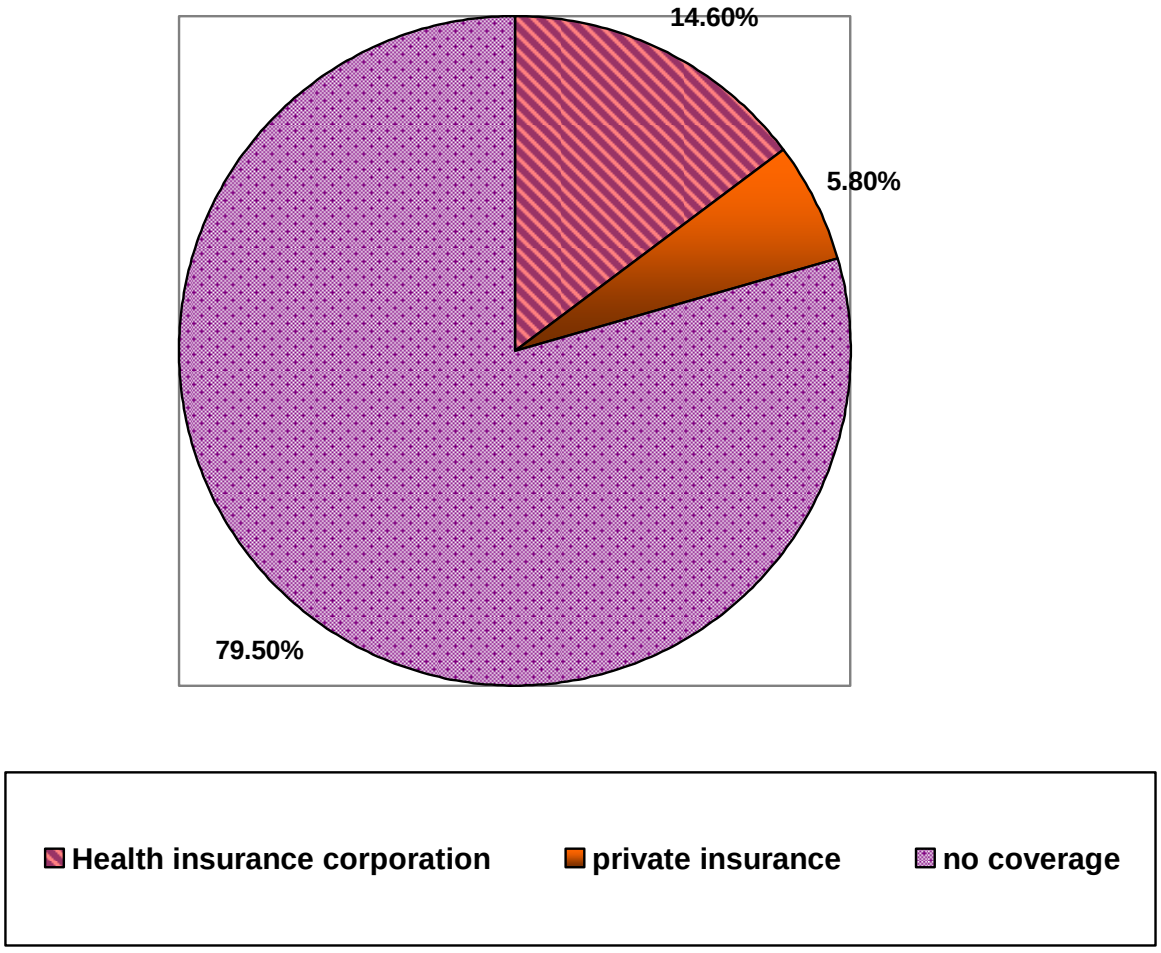


Figure (5).Distribution of malaria episodes according to the method of diagnosing malaria - Khartoum State September 2003 (N = 513)

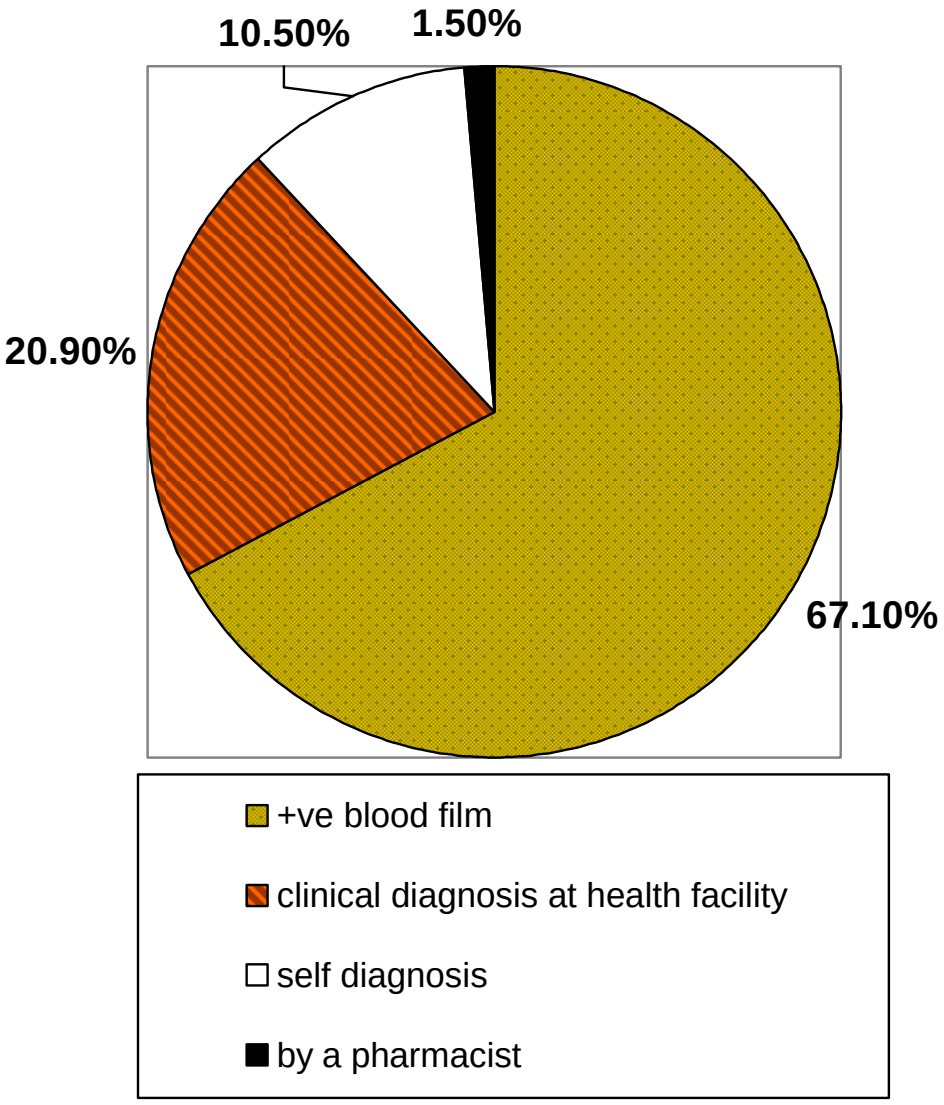


Figure (6). The distribution of the reported malaria episodes according to the first action taken - Khartoum State September 2003 (N =513)

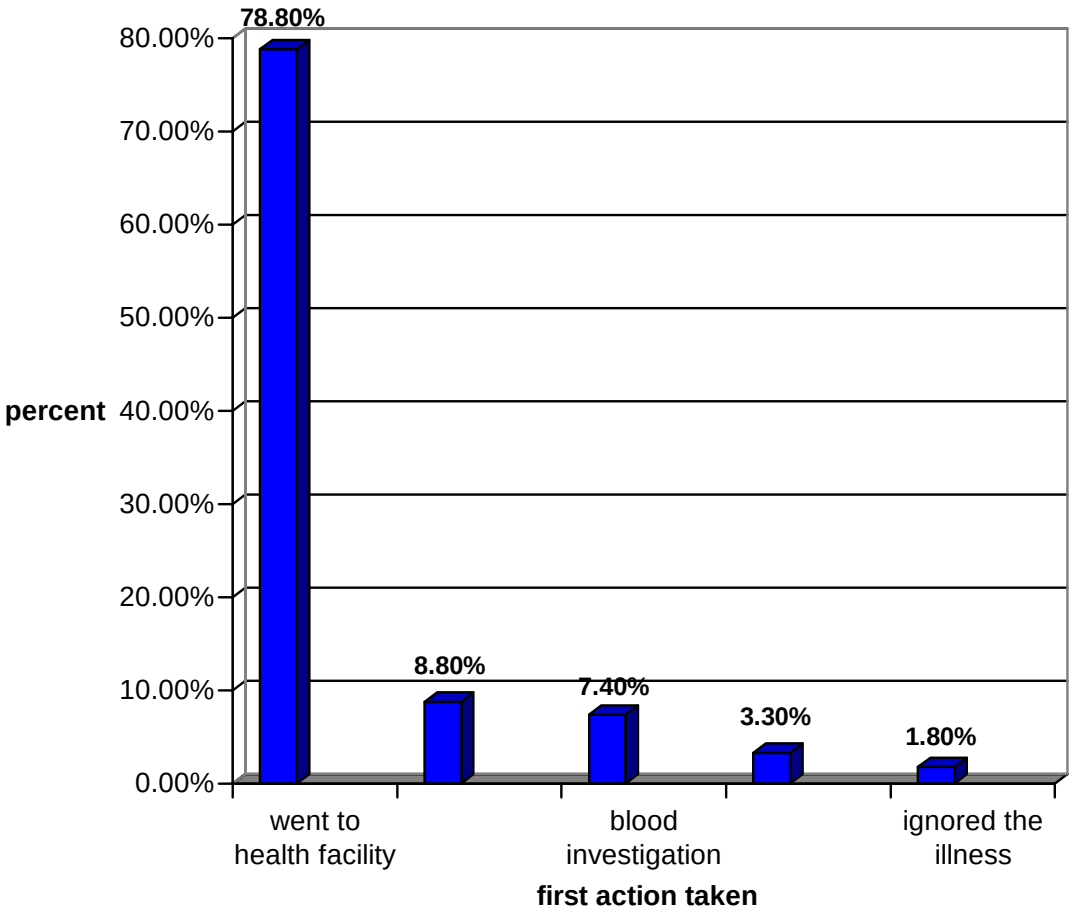


Figure (7).Types of Treatments taken for self-treatment - Khartoum State September 2003 -(N = 45)

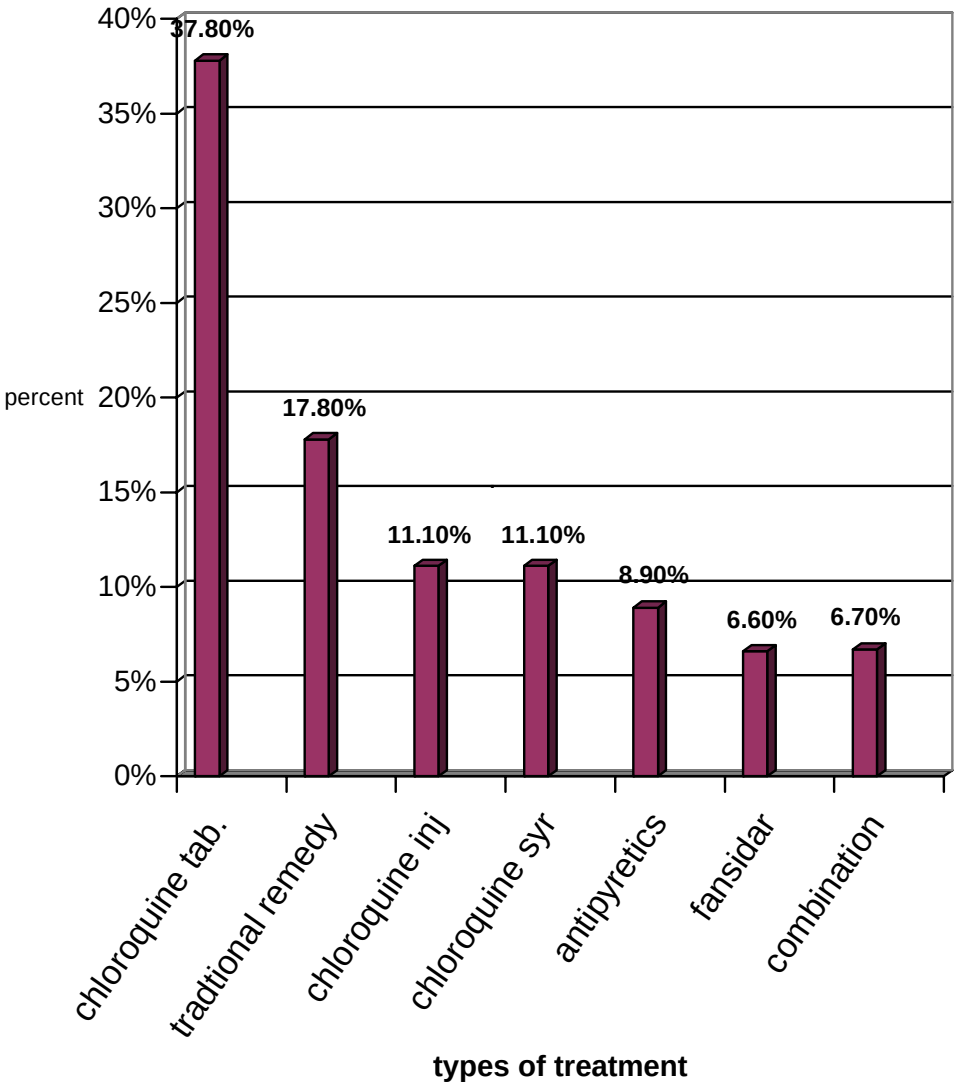


Figure (8). Compliance with the recommended protocol of the National Programme of Malaria for those who had self treated - Khartoum State September 2003 (N = 36)

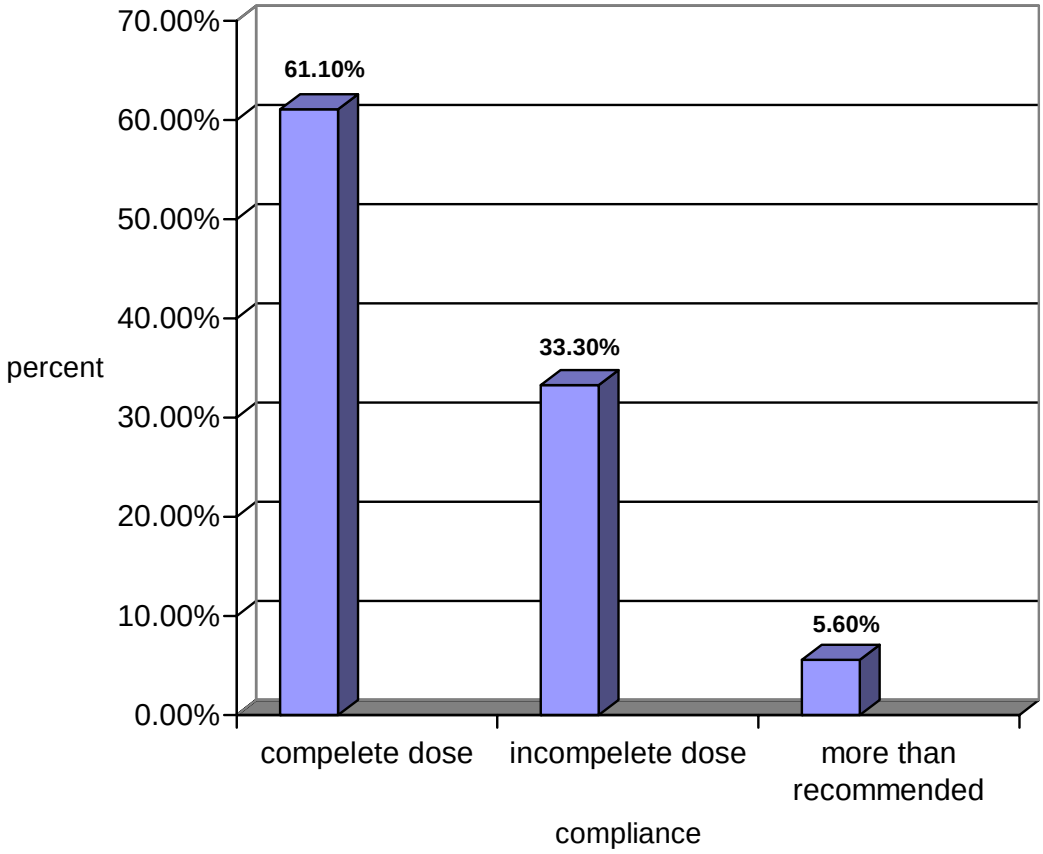


Figure (9). Types of health facilities visited during malaria episodes, Khartoum State September 2003 (N =404)

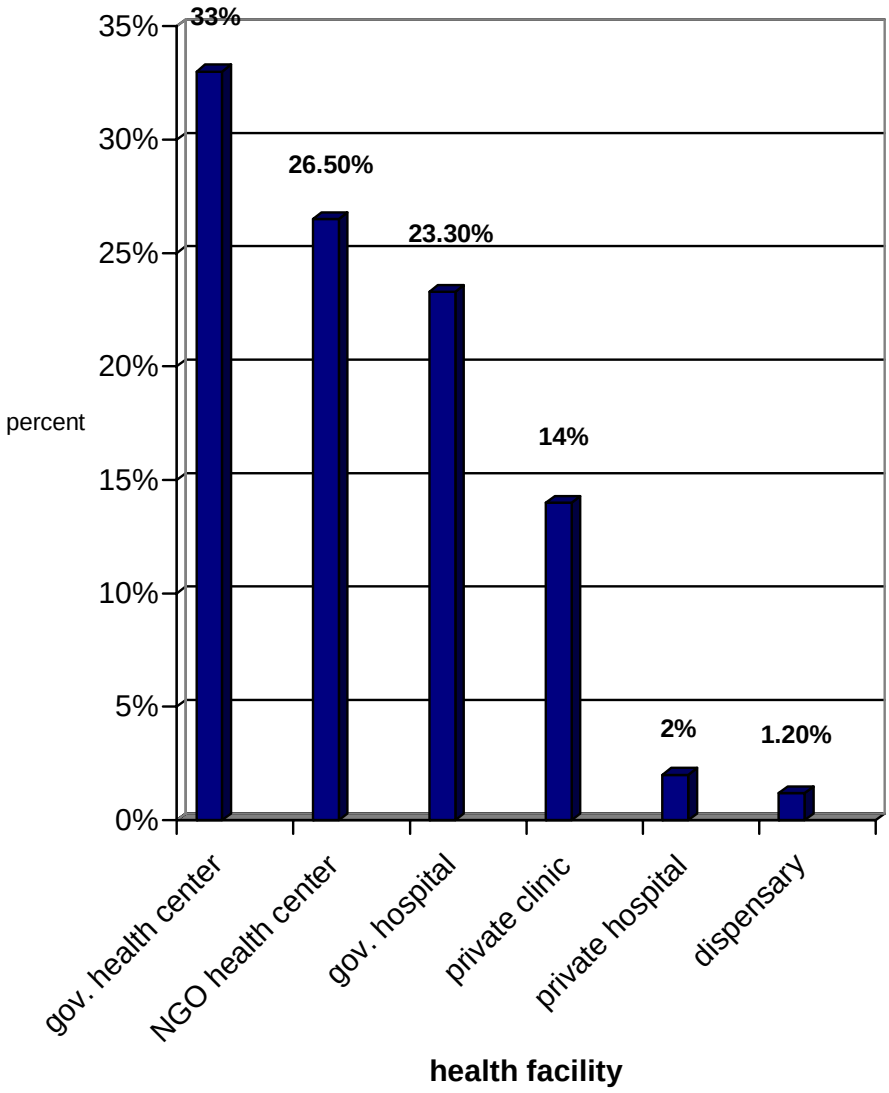


Figure (10). Causes of choosing public governmental or NGO health facilities for malaria treatment, Khartoum State September 2003 (N 332)

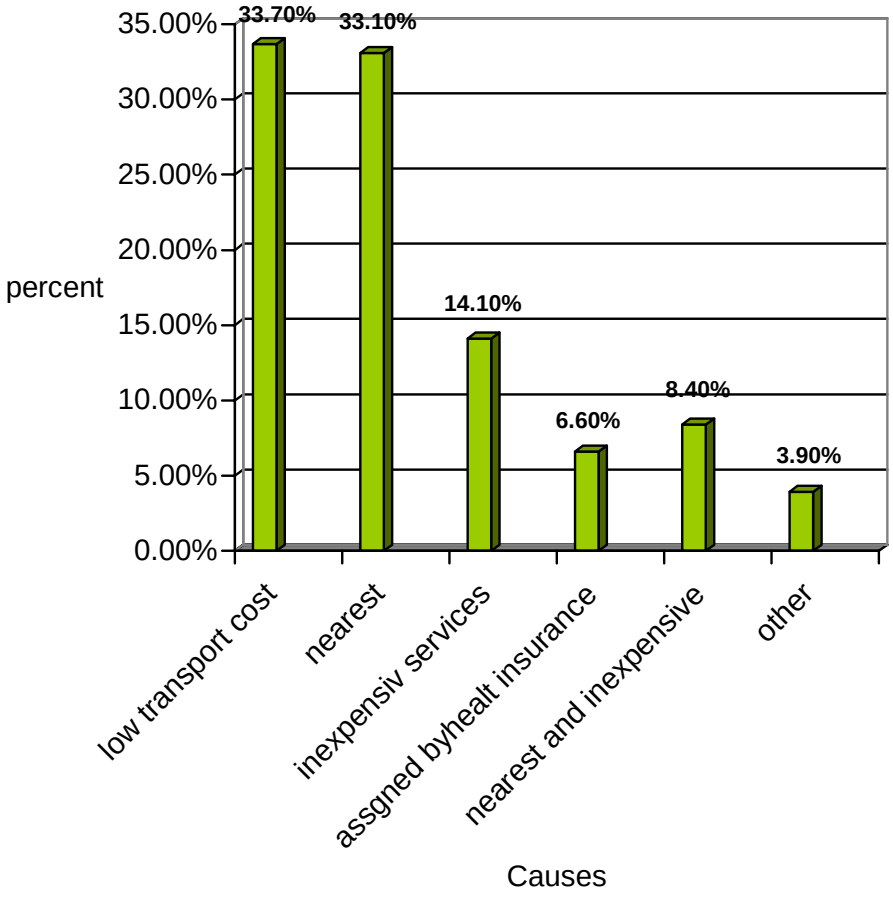


Figure (11). Reasons for choosing private health facilities for malaria treatment - Khartoum State September 2003 (N 72)

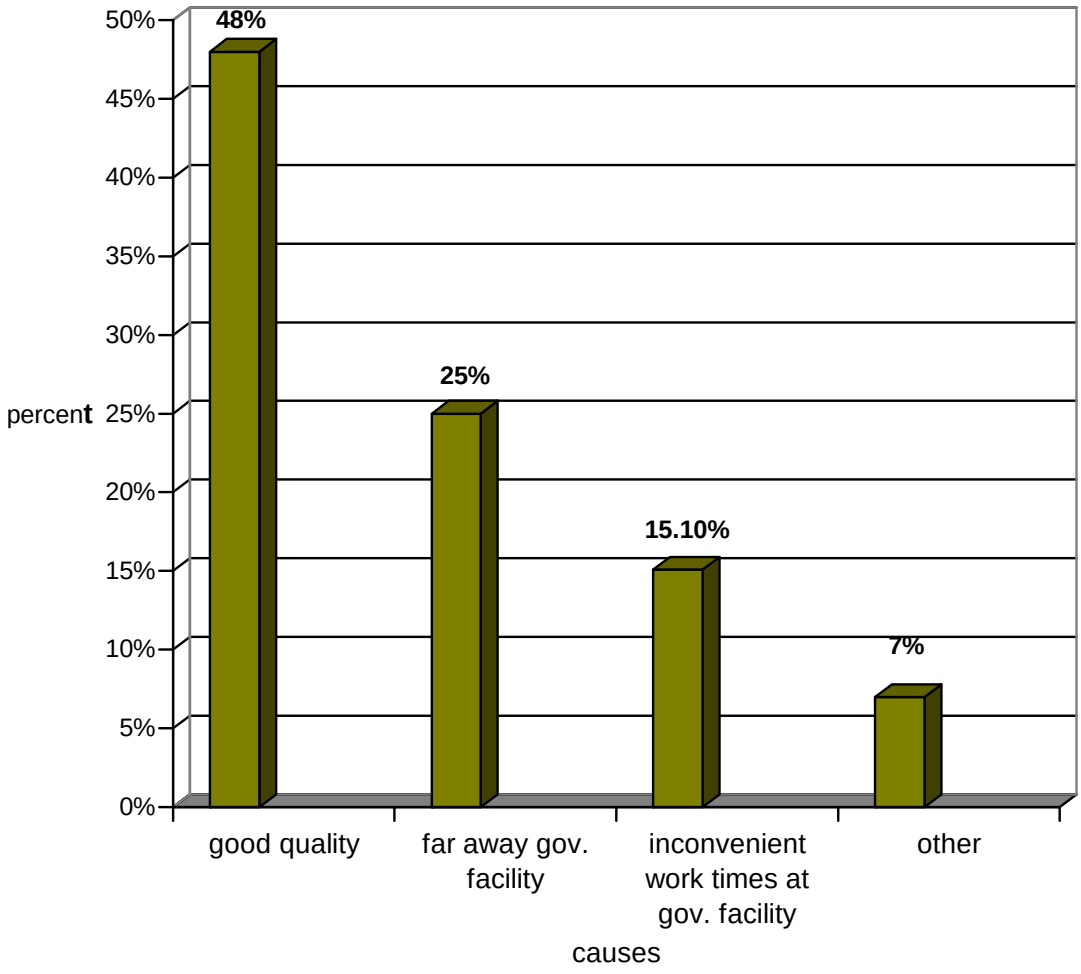


Figure (12). Reported compliance to caregiver instructions for taking treatment - Khartoum State September 2003 (N 404)

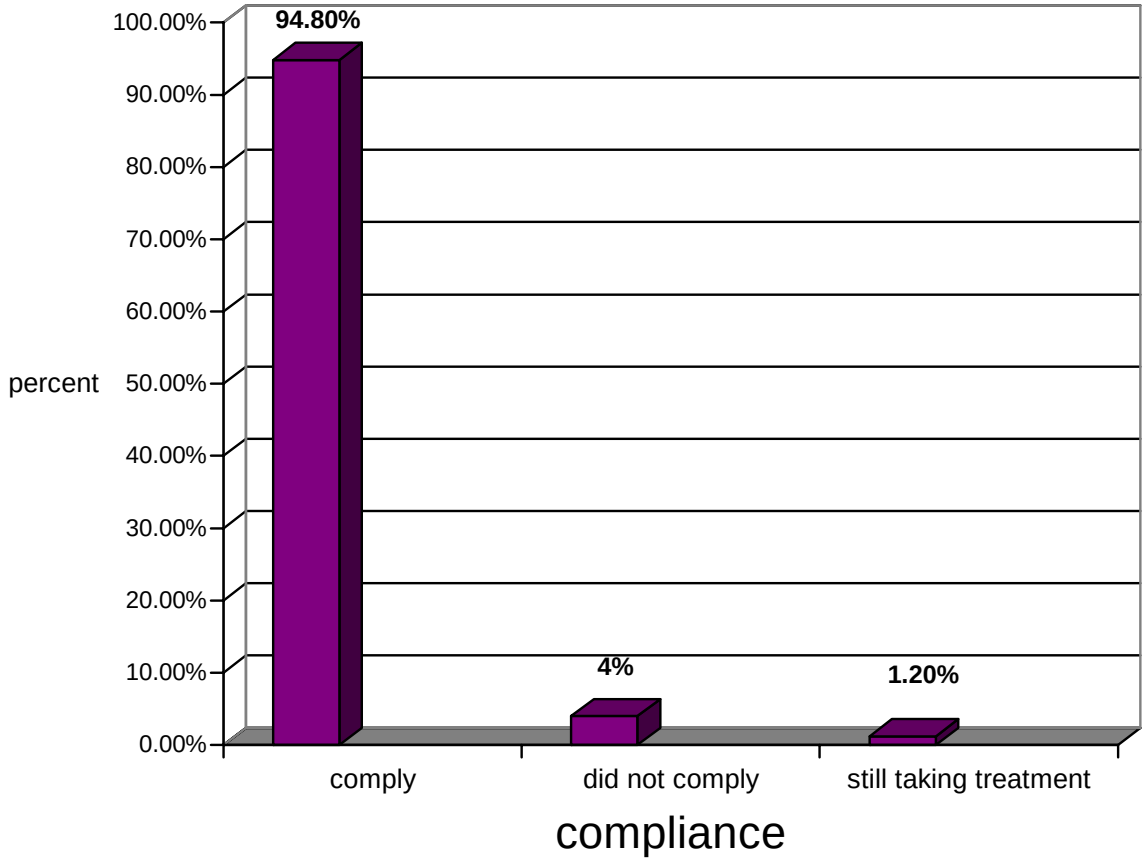


Figure (13). Course of illness for the reported malaria episodes after the first action- Khartoum State September 2003 (N =513)

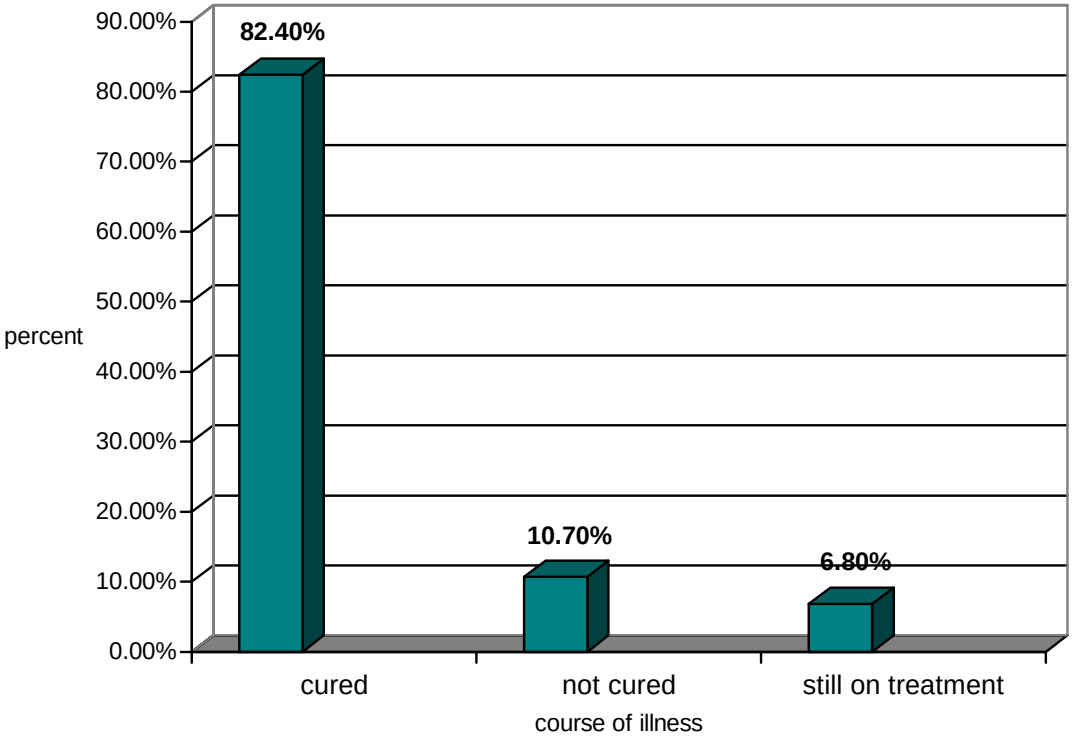


Figure (14). Second action taken by those who were not cured after the first action - Khartoum State September 2003 (N =55)

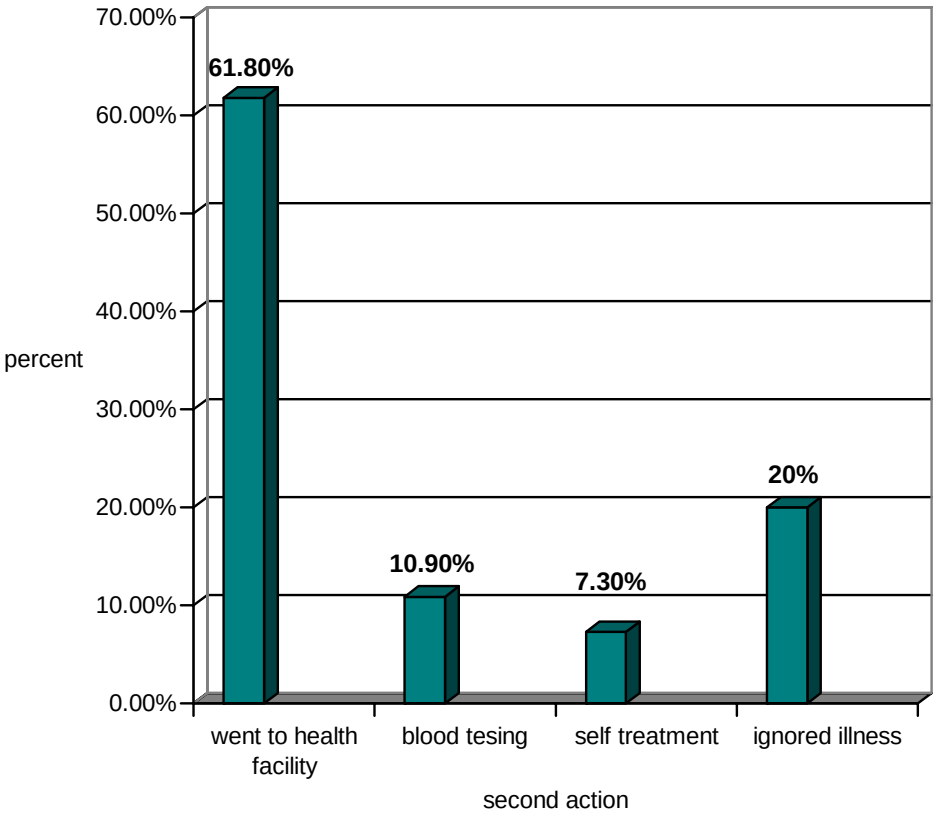


Figure (15). Course of illness for all reported malaria cases after taking all actions - Khartoum State September 2003 (N=513)

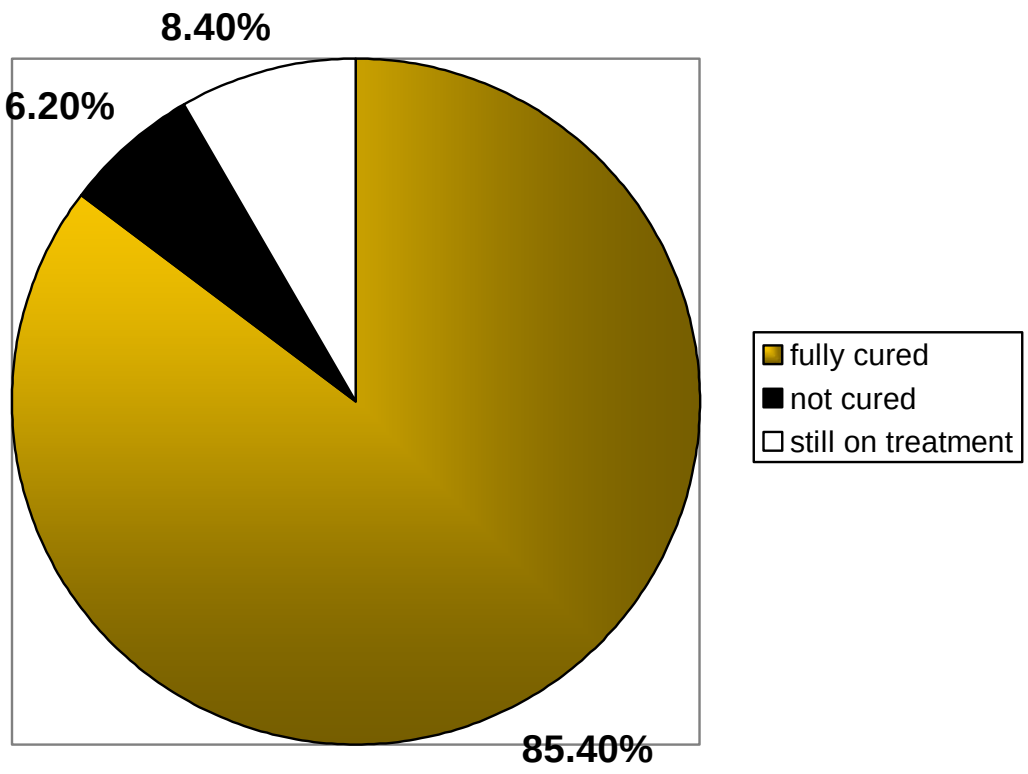
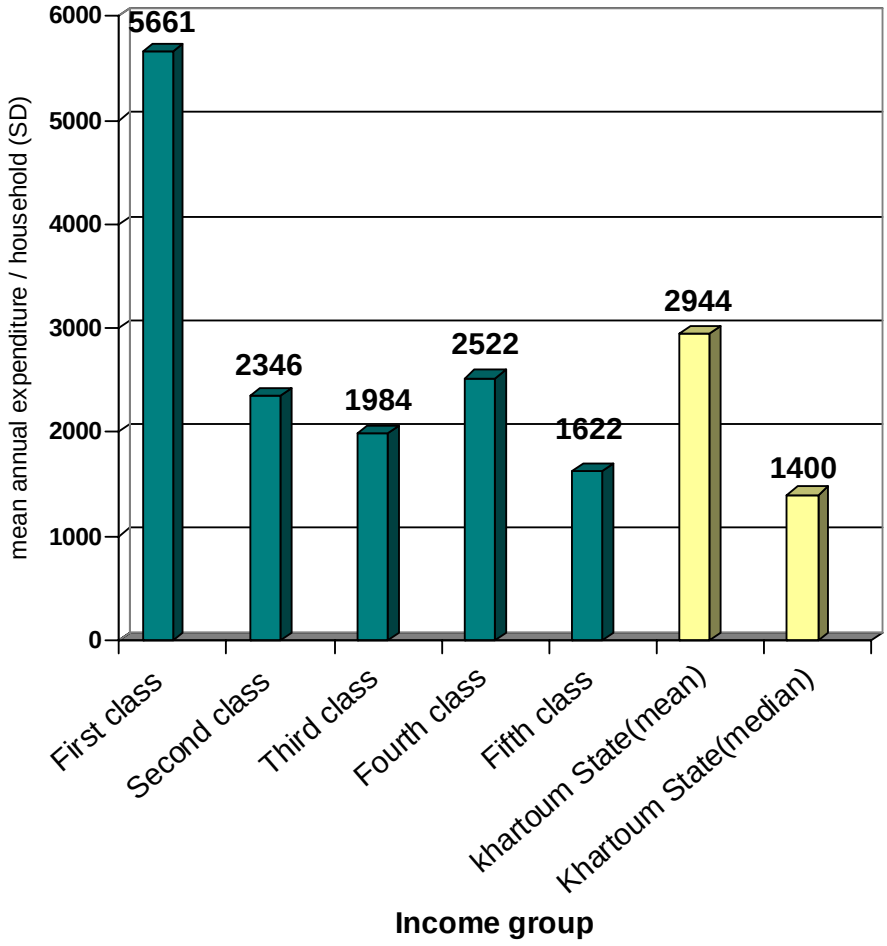
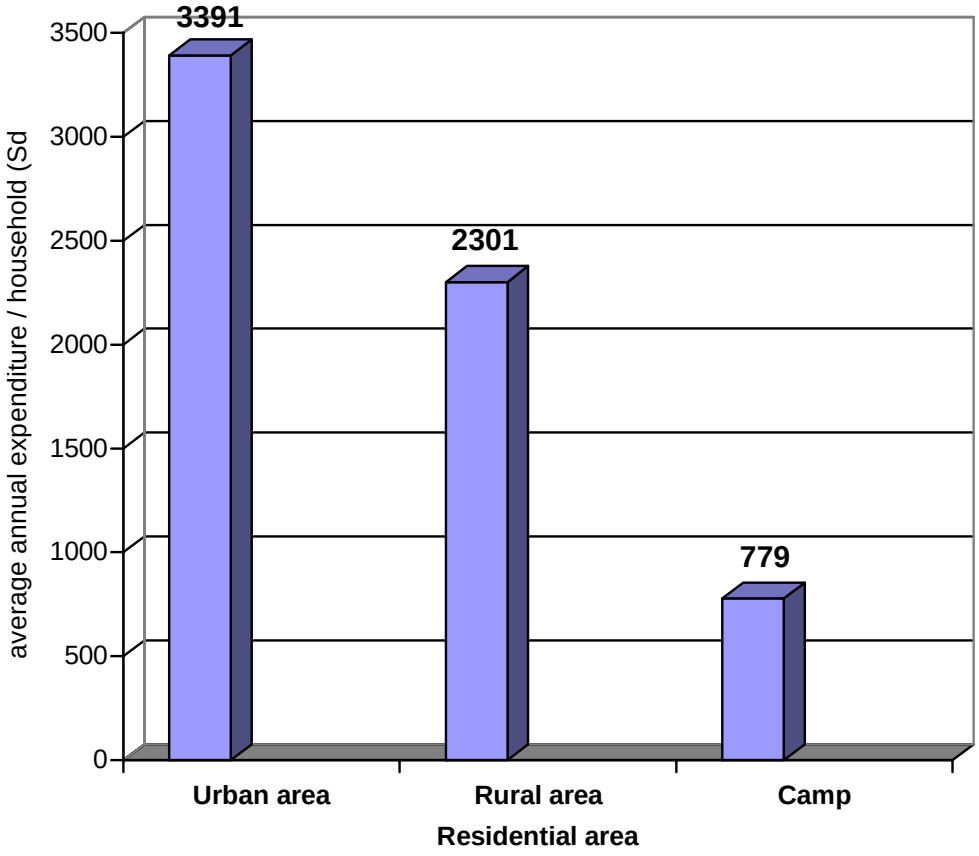


Figure (16). Average annual expenditure on malaria prevention per household in Khartoum State, and by different income group - Khartoum State 2003 -(N = 356) P< 0.05



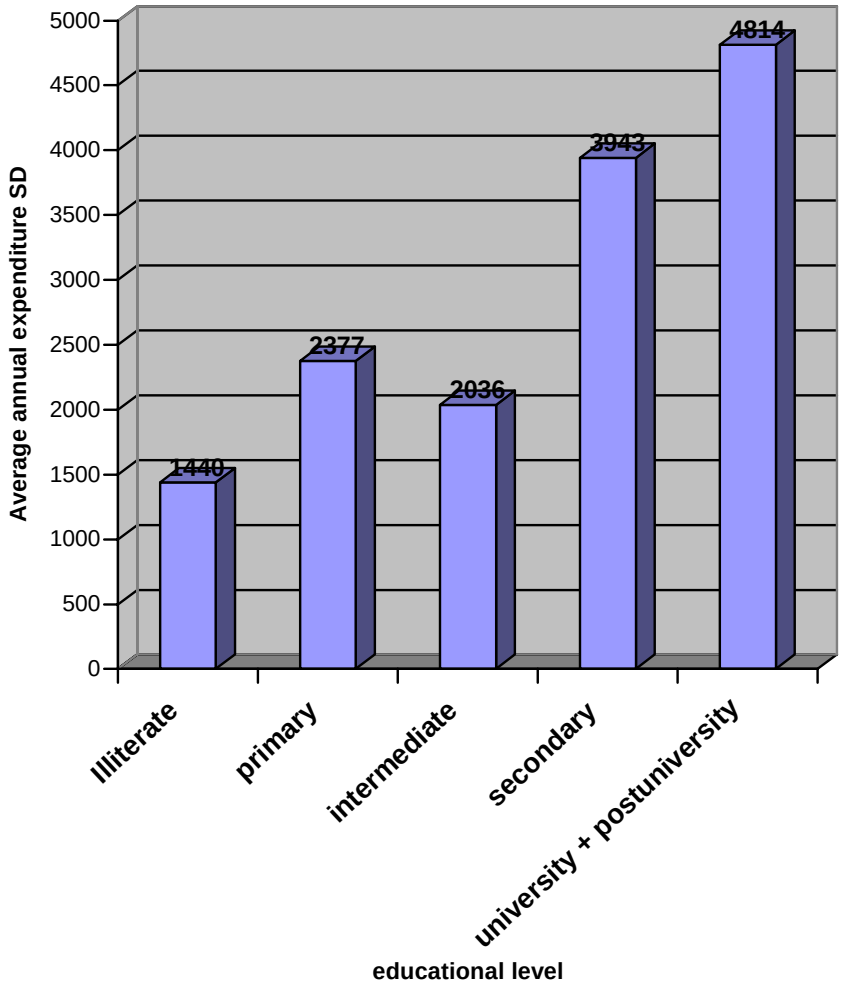
(F: 6.3 – df: 4 p: 0.000 – CI for mean = 2458 – 3753.7)

Figure (17). Average annual expenditure on malaria prevention per households in the different residential areas - Khartoum State 2003 (n = 356)



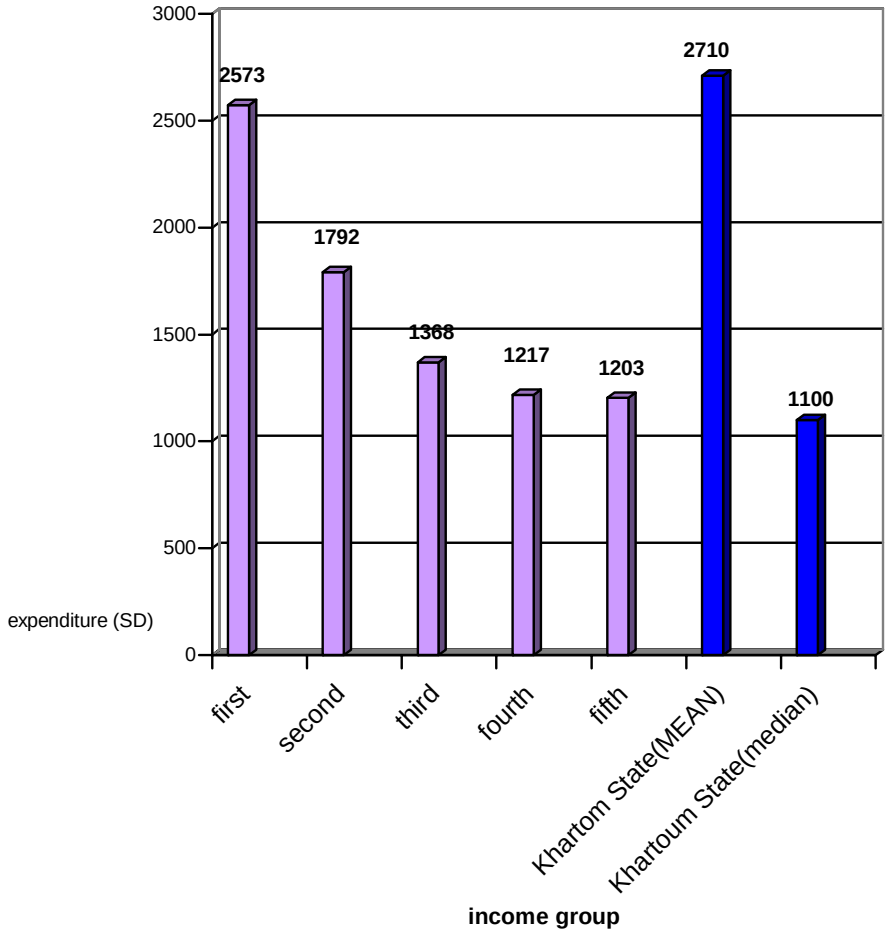
(F: 1.811 – df: 2 - p<0.05)

Figure (18). Annual average expenditure on malaria prevention according to the educational level of the head of the household- Khartoum State September 2003 (N =356) p<.05



(F: 1.814 – df: 8 – p:0.002)

Figure (19). Shows the average monthly expenditure for malaria treatment per household in Khartoum State and by different income groups, Khartoum State September 2003 (N =445) (p<0.05)



(p<0.05)

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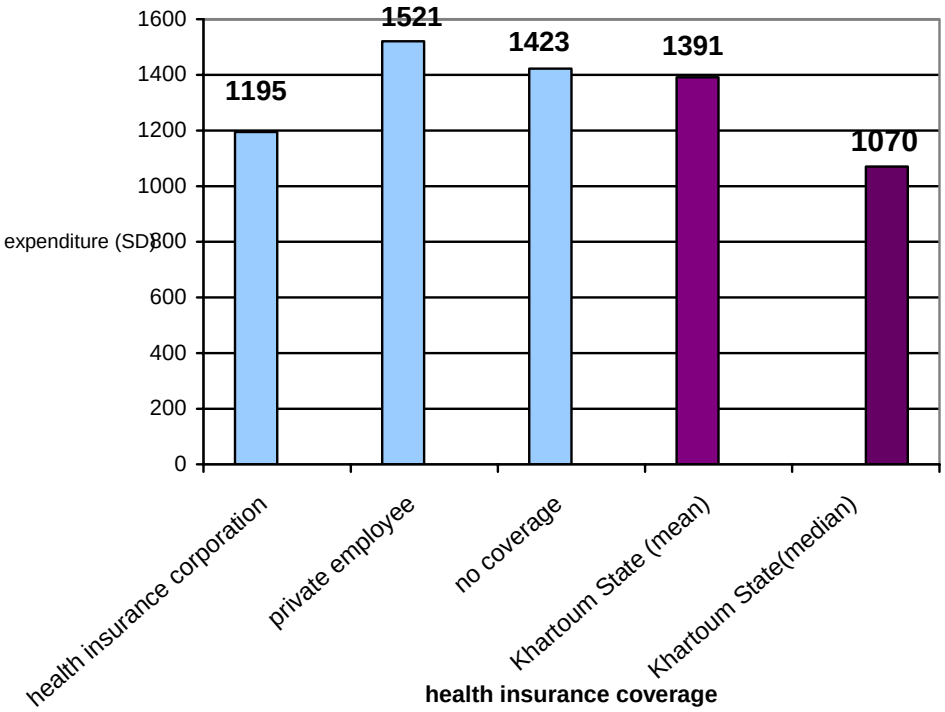
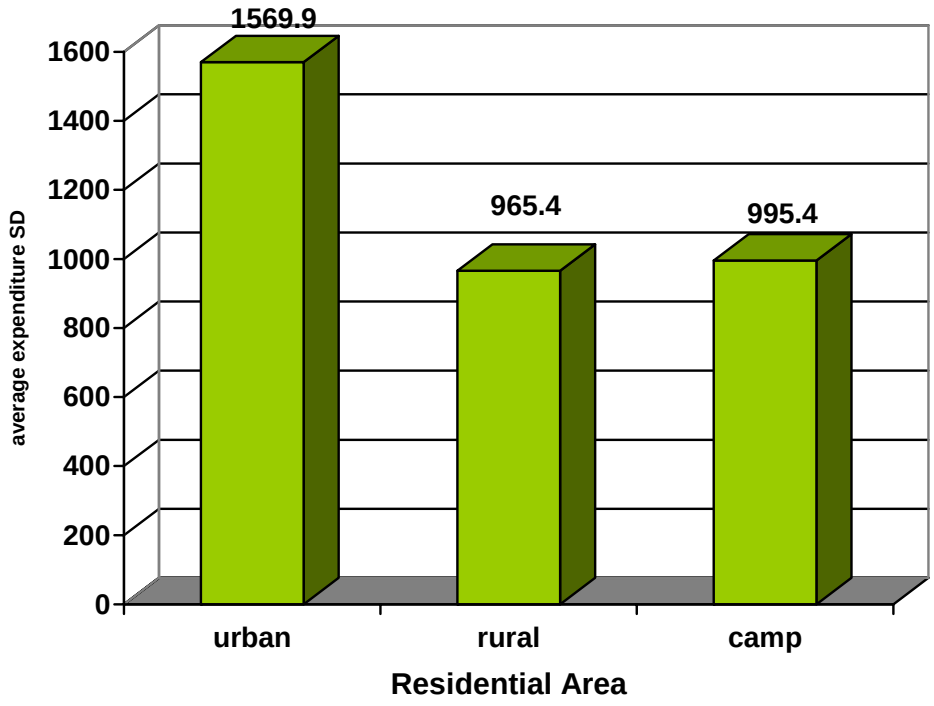
Figure (20). The average expenditure on malaria treatment per fully treated case, in Khartoum State, and according to insurance coverage , Khartoum State September 2003 (N = 438)(p< 0.05)



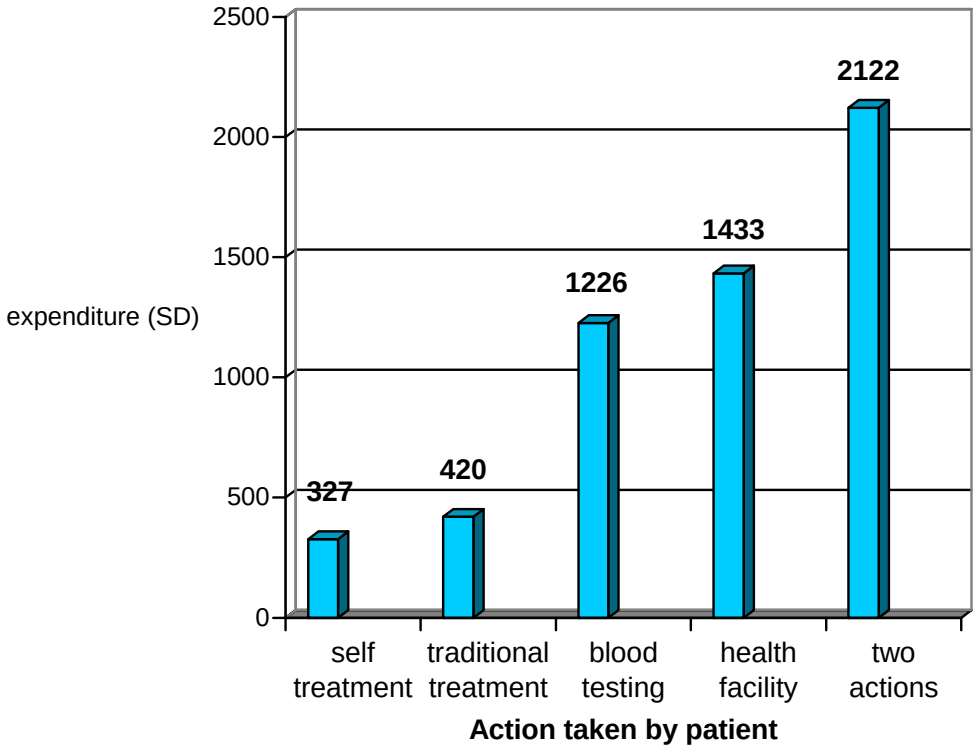
(F: 1.14 – df: 2 - p<0.05)

Figure(21). The average expenditure on malaria treatment per fully cured case in different residential areas - Khartoum State September 2003 (N =438)



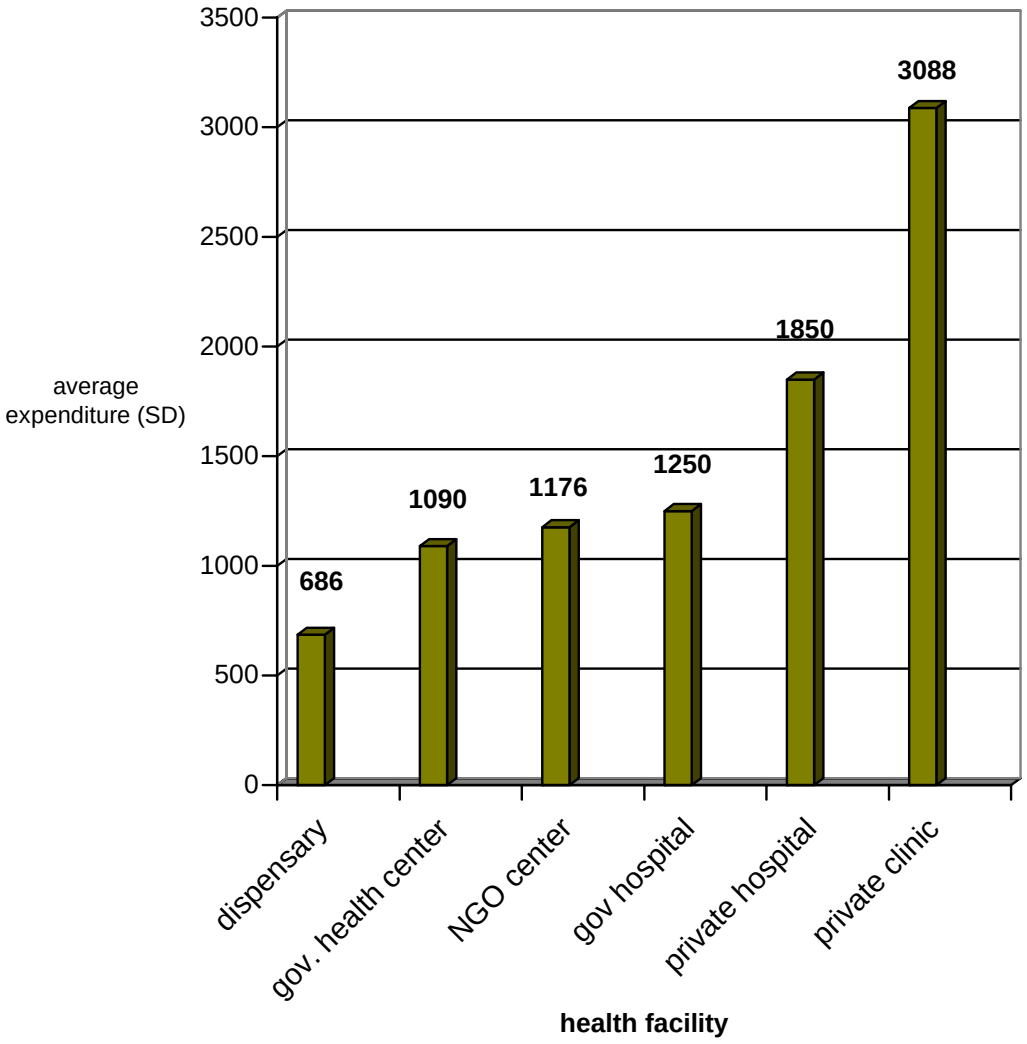
.(F:9.084 – df:2 – p:0.000)

Figure (22). The average expenditure on malaria treatment per fully treated case according to the action taken by the cases, Khartoum State September 2003 (N = 438)



(F: 7.6 – df:4 – p: 0.000)

Figure (23). The average expenditure on malaria treatment per fully treated case according to the type of health facility used by the cases, Khartoum State September 2003, (N = 404)



(F: 23.27 – df:7 – p:0.000)

Figure (24). The breakdown of the direct expenditure on malaria treatment per fully treated case, Khartoum State September 2003 (N = 438)

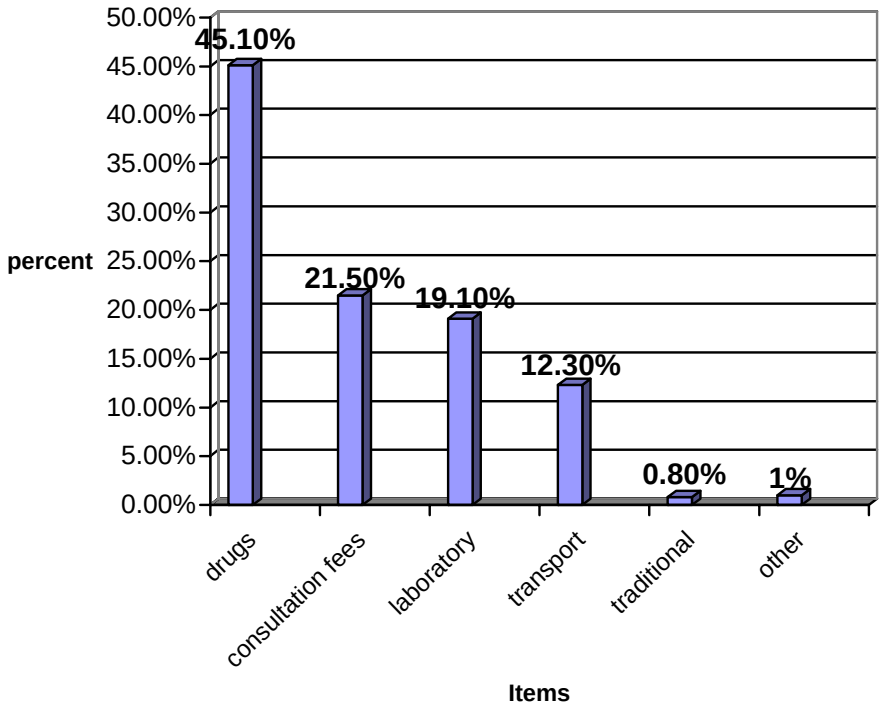
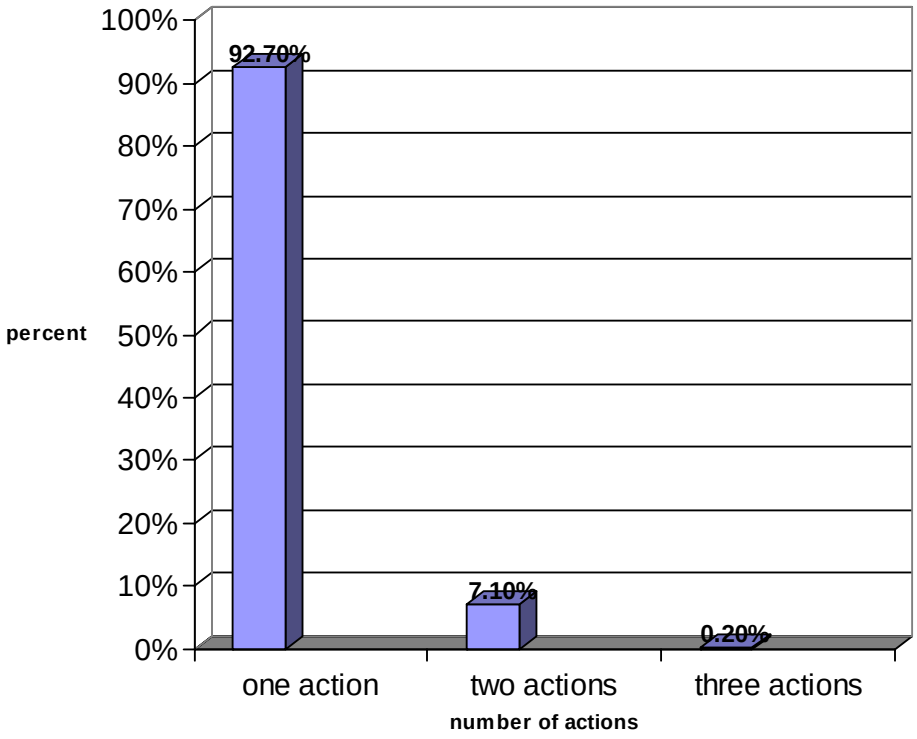


Figure (25). The distribution of the reported malaria episodes according to the number of actions taken to treat malaria , Khartoum State September 2003 (N = 513)



(chi-square: 438 – df:8 – p:0.000).

Figure (26). The relation between the number of actions taken and the first action taken to treat malaria, Khartoum State September 2003 (N =513)

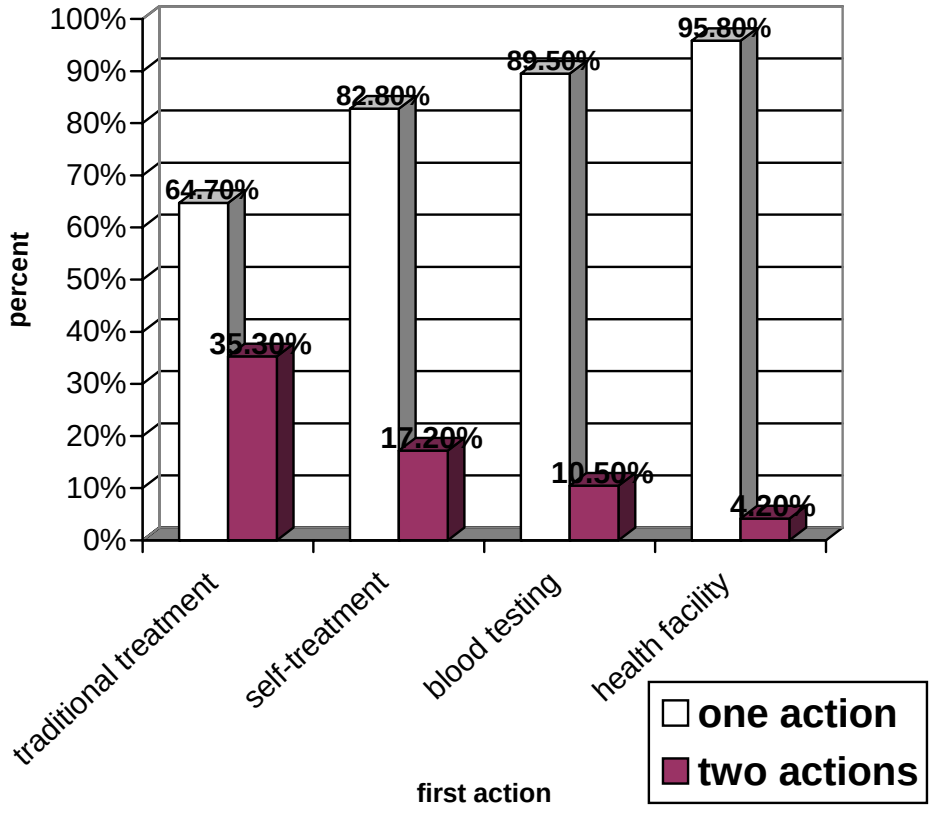


Table (2). The average annual expenditure on different methods of malaria prevention per household, Khartoum State September 2003 (N= 356)

Prevention method	Mean cost(SD)	Median (SD)
Bed nets	1740 (1434)	1200
Impregnated bed nets	1943 (1908)	1000
Residual spraying of houses	1560 (27510	500
Larivciding activities	1513 (2843)	200
Screening	4666 (5052)	3000
Repellents	1475 (2133)	600
Insecticide aerosol sprayers	3102 (7461)	725

Table (3). The percent of annual income and monthly income depleted by prevention and treatment expenditure respectively, in Khartoum State and in different income groups, Khartoum State September 2003 (N = 904)

% of income Group	% of annual income depleted by prevention expenditure	% of monthly income depleted by treatment expenditure
Khartoum State	0.6%	5.9%
First income group (highest income)	0.4%	2.1%
Second income group	0.5%	4.1%
Third income group	0.6%	4.7%
Fourth income group	1.1%	6.6%
Fifth income group(lowest income)	1.4%	12.8%

Table (4).The coefficients of multiple regression of expenditure on malaria prevention, Khartoum State September 2003 (N = 356)

	Beta	Significance
Constant	-.049	.925
Educational level of head of the household	.127	.048
Income group	.163	.011

Table (5).The coefficients of multiple regression of monthly expenditure on malaria treatment, Khartoum State September 2003 (N = 438)

	Beta	Significance
Income group	.185	.000
Residence	-.183	.000
First action taken by patient	.125	.017
Insurance status	.095	.04

CHAPTER FOUR

4.1. DISCUSSION

This study has attempted to estimate the expenditure incurred by households for malaria prevention and treatment.

Cost of illness studies face difficulties in how the data should be presented, in particular whether measures of central tendency best reflect or represent the cost burdens facing the study population. Illness and illness costs are usually distributed very unevenly across households, with a minority incurring very high costs, so measures of central tendency conceal wide variations in cost burdens. The use of mean cost figures, in particular, often exaggerates the cost burdens faced by most households because a minority of high values pull the mean above the median. Median figures may therefore reflect more accurately the costs facing the majority of households[28]. As this was case in this study, the median was used in addition to the mean.

The mean cost of preventive measures against malaria during last year per household was found to be 2944 SD (5517) and the median was 1400 SD or US$ 5.4 per household. Comparing with other malaria endemic countries this value was observed to lay towards the lower limit of the range of per month household average expenditure on malaria prevention from $0.024 to $15 mentioned by Chima et al (2003) in their review article[20].

The low use of preventive measures against malaria shown by this study reflects the practices in other malaria endemic countries where low uptake of prevention methods was documented[6]. Studies in Zimbabwe, Kenya, and Ethiopia, reported that the bed net use was less than 10% among households[26,30,53]

In this study the reported non-use of preventive measures was higher than many of the other countries, where the percent of households not using

any protective measures against malaria ranged from only 23%in Ghana[21] to 2.3% in Kenya[44].

The uptake of preventive measures was found to be even lower in households from low income groups compared to those from higher income groups.

This result is supported by the evidence that one of the important determinants of malaria preventive measures use is affordability[13,36,44,45].

There was a positive correlation between income and prevention expenditures. Income was mentioned as one of the most important determinants of prevention expenditure by many authors[12,13,14,27,39,44]. Multi variant analysis had revealed that income group was the most significant determinant on prevention expenditure.

However, it is clear from the study that the poor, although paying less, bear a greater burden than the rich. Evidence had shown that, the direct costs of health care are regressive, imposing a greater burden on poor families than on better-off families[7,14,28,38,42,46]. In Malawi, the estimated annual expenditure on prevention and treatment of malaria comprised 0.9% and 28% of annual income in very low income households respectively. These expenditures comprised and 0.5% and 2%of annual income in low and high income households respectively[6,13,28].

Despite the higher risk of malaria transmission in rural areas and camps they used and consequently spent less on malaria preventive measures than their urban counterparts. Zone of residence (rural or urban) was mentioned by some authors as an important determinant or proxy for use and appropriate use of preventive methods[13]. In Burkina Faso, Guiguemde (1994), found that expenditure on malaria prevention was high in urban areas compared to rural areas, despite the increasing incidence in the rural areas[24].

The low preventive measure uptake in rural areas might be due to low socioeconomic status and most importantly low level of education.

The significantly higher uptake and expenditure on preventive measures by individuals of higher educational levels found by this study, attracts the attention to the educational level as determinant of prevention related expenditure. Low use and expenditure on preventive measures reflected the lack of awareness by the households about the devastating impacts of malaria, including its socio-economic impact. The educational level was found to be a major determinant of preventive expenditure by multivariate analysis. Rashed et al (2000) had documented the education level as one of the determinants of household malaria related expenditure in Benin[29].

There is now ample evidence that sustainable reductions in the malaria burden depend not only on the use of effective tools but also on the successful integration of behavioural change in activities at the community level[6,54]. The control of urban malaria especially depends on the community, as the focal nature of breeding sites requires their participation in environmental management activities. Activities, such as drainage of water collections and maintenance of drains require minimum financial expenditure by households, and had proven tremendous success in reducing malaria transmission in urban settings[54].

Although not elicited here, one of the factors that may have limited the use of preventive methods is the unavailability of these methods- such as impregnated bed nets -on a large scale in the State. Many of the respondents in this study expressed their ignorance about this preventive item. In addition to cost constrains, lack of information about, and poor access to markets of preventive measures are documented barriers to preventive measure use[30].

The mean expenditure to treat malaria morbidity per household per month was found to be 2710 SD(2191), and the median was 1100 SD equivalent to US$4.2. This lies also towards the lower limit of the range mentioned by Chima et al (2003) for average monthly expenditure which was $ 1.88 to $ 26 per household[20].

The mean direct cost for treating malaria per case was found to be 1391 SD(1334)US$5.35 and the median was 1070 SD or US$ 4.1 This is slightly lower than what Ali et al(1998) found in Wad Medani, an average expenditure of US$5.2 per case[23]. Both differ greatly from what Onwujkwe (2001) found in Khartoum State, which was (US$10) 2571 SD(US$9.8) for urban areas, 3402 SD (US$13)for peri-urban areas, and 1933 SD(US$7.4) for rural areas[10].

The largest proportion of expenditure went to drugs. Many other studies had shown that a large proportion of spending on malaria goes towards pharmaceuticals[24,28,33]. In Ghana they accounted for 62% of direct costs for mild malaria[28]. They accounted for 34.9% of all treatment costs in Burkina Faso[24]. The fact that the proportion reported by this study was less compared to other studies was that chloroquine the cheap drug was still used for treating malaria at the time of data collection, whereas in these countries development of resistance to chloroquine had required the introduction of more potent and therefore more expensive drugs than chloroquine[21,55]. The proposed shift from chloroquine to the more expensive combination therapy (artesunate plus sulphadoxine pyrimethamine) as the first line drug will increase not only the proportion going to drugs but also the total treatment related expenditure per case. A course of effective artemisinin-based combination therapy may cost up to $ 5 whereas a case used to be fully treated by monotherapies at a cost of only $ 1.[56]

Although the probability of finding a malaria case in rural households was more than in urban households, probably due to the favorable conditions for transmission in the former area[5], urban residents expended significantly higher sums on malaria treatment compared to rural residents. The explanation behind this was the higher accessibility to health services, and the clustering and use of private facilities in urban areas rather than a higher number of cases. Rashed et al (2000) had mentioned that expenditure on malaria treatment tend to be higher in urban areas due to such factors as higher income of residences, expensive health services and high accessibility to health services[22].

In Malawi, it was observed that treatment expenses for private consultation were significantly higher in urban areas and the proportion of total treatment costs accounted for by private consultation were 11% of rural and 48% of urban total treatment expenditure[13].

The role played by health insurance in reducing out of pocket expenditure on treatment found by this study is not new. Despite the low coverage by health insurance, it was found to be one of the determinants of treatment expenditure by multivariate analysis, associated with low expenditure. Results reported by many authors had documented that coverage by health insurance is a significant factor protecting families against financial losses[15,42,47,48].

Russell (2004) emphasized that the reduction of direct medical costs, would be achieved through expanding coverage of tax- or insurance-based financing systems to protect poor households from out-of-pocket payments for health care, since these payments impose significant barriers to access and considerable cost burdens on the poor[28].

The result reported by this study in that there was no difference in malaria incidence between different income groups, is supported by the evidence

that malaria incidence by socioeconomic groups within countries does not show any clear poor-rich gradient[13,28]. Malaria, unlike diseases resulting from poverty, does not discriminate between rich and poor victims. The lack of consistent socio-economic differentials in malaria incidence is not necessarily counterintuitive given the epidemiology of malaria transmission[13].

On the other hand and on monetary terms, and as with case of preventive expenditure, the study found a positive correlation between income and treatment expenditures. This is again supported by the fact that one of the key determinants of expenditure on malaria treatment, is income[13,14,27,39,44]. Multi variant analysis revealed that income group was the most significant determinant of treatment expenditures.

However, although on absolute terms the poor pay less on treatment , on relative terms a greater share of their incomes were depleted compared to their better-off counterparts. 64% and 29% of household's income was spent by poorest quintile in Kenya and Tanzania respectively on a typical illness episode compared to 1% for the highest in both countries[7].

Such high cost burdens for the poor are likely to trigger coping mechanisms, that in turn may have knock-off effects on these households[20,28]. A recent review of malaria and poverty has argued that malaria prevention and treatment programmes need to have more of equity focus and better targeted to the poor[28].

The high use rate of formal health services, reflected by this study differed from the trend of seeking care for malaria in other malarial countries[4,14,38] Even a rate of formal health services use of 40% was considered by some authors as high[38].

This also showed that, not only the proportion who delayed seeking care for their illness was low, but also the average period of delay was

considerably lower than what was reported from other countries. Rates as high as 83% and delays for periods as long as a week had been reported from some African countries[27].

The swiftness of taking action and the high level of facility use can be explained by the wide accessibility to health services in Khartoum State especially in urban areas, which are provided by the government, non governmental organization and the private sector[26].

In addition to their abundance the health facilities are established within residential areas. This high access to health services may also be behind the high proportion of confirmed malaria cases noticed during this study, and the high proportion of respondents who had used no transportation means to reach their destiny while seeking care.

This study showed that visiting a health facility was associated with a higher cost per case, a finding supported by many other studies in that seeking treatment for malaria at health facilities was found to incur the greatest out of pocket expenditure[13,22,27,33].

The average cost per patient was especially high for those who consulted private providers than those who went to a governmental or NGO organization facility. The variations in average treatment costs are usually a function of the substantial differences in fees charged by the two different sectors, and the travel costs to each source of treatment[4]. Booth, and MacLean (2001), Attanayake et al[4] (2000) and Ali et al[23] (1998) all agreed in that individuals treated at private clinics paid significantly more for malaria treatment than those treated at public health facilities.

The low rate of self treatment also differs from the practice in other malarial countries[26]. It is reported that 44% of the self treatment rates in African countries were above 50 % with rates as high as 97%[4,27].

As was expected self treatment had a lower cost per patient than visiting a health facility. However those who had not consult the formal health

system as their first response to symptoms, were forced to resort to it as a second action increasing the cost significantly for themselves.

Among the small proportion who took self treatment, with or without doing blood investigation for malaria, lack or shortage of money was mentioned as one of the main reasons. Most studies found that the financial costs were the most significant determinants of care seeking[13,26,33,39,40]. Thus despite the high use rate of health services in Khartoum, it is obvious that still some sectors of the community cannot afford the cost of the health care. Even among those who had sought prompt care from the official health system, some might have been forced to use some of the coping mechanisms such as borrowing or selling some assets to secure the necessary money for treatment. The seriousness of self-treatment originates from probability of under dosing which will lead to drug resistance in the long run and increase the cost of treatment through the introduction of expensive drugs.

The setting in Khartoum State is favourable for high out of pocket expenditure, due to:

- High accessibility and use of health services.
- Implementation of the fee-for-service system at the health facilities.
- Limited coverage by health insurance.

Ke Xu et al (2003) reported that the triad of poverty, health-service access and use, and the failure of social mechanisms to pool financial risks account for most of the variation across countries in the level of out-of-pocket expenditure. It is expected to see high rates of spending in countries with high rates of poverty, groups excluded from social insurance, and moderate to high levels of health-care access and use[47].

This situation puts all the population of the State at the risk of high out of pocket expenditure for the treatment of malaria and other diseases, and as

Ke Xu et al (2003) stated, risk protection policies, by mechanisms such as health insurance, would be especially important in this situation[47].

However, the behaviour of the population it self add to this risk of high out-of-pocket expenditure. In Khartoum State those who used private facilities had paid irrationally high consultation fees reaching up to 5000 SD, for a disease that can be fully cured by an average (median) of 1070 SD. These same individuals and others in the state are reluctant to protect themselves from this disease by purchasing an impregnated bed net that cost only an average of 12 SD. It is obvious that there was imbalance between expenditures on malaria prevention on one hand and on treatment on the other hand. This is most probably due to the low uptake of preventive measures and the high tendency to seek treatment from facilities.

4.2. CONCLUSION

Malaria placed a great financial burden on households of Khartoum state in terms of prevention and treatment expenditures. The financial burden was especially tremendous on households of low socioeconomic status and residents of rural areas and camps as it depleted a greater share of their average incomes. The treatment associated expenditure was also high for those not covered by health insurance and those using health facilities especially of the private sector for treatment of malaria.

Generally, as regard to the whole population of Khartoum State, there was low uptake and expenditure on preventive measures on one hand with a high tendency to seek prompt treatment for malaria and expend more on it on the other hand.

4.3. RECOMMENDATIONS

To reduce the expenditure by households and to address the imbalance between treatment and prevention expenditures, the following recommendations are proposed:

The coverage by preventive measures should be increased to decrease the burden of treatment expenditure on the long run. This could be through first; removing the financial barriers for the poor households and residents of rural areas and camps through targeted subsidies and exemptions. In addition to that availing preventive measures such as ITN close to households through distribution via primary health care centers will also reduce the associated transportation cost associated with purchasing these items. Second; developing health education programmes to encourage rich households to increase their uptake of preventive measures this will relieve some of the financial burden off the government and allow more concentration on economically vulnerable groups and those at higher risk of malaria infection. Health education messages should also encourage households in urban areas to participate in preventive measures and to adopt activities that are not associated with direct expenditure, such as environmental management that had proven great effectiveness in urban malaria control. The Ministry of health will be able to target rural households and camp residents' with residual house spraying and ITNs distribution. More over intensive health education should be directed to the whole population of Khartoum State. Messages should reflect the economic impact that malaria imposes on households and should stress the fact that any expenditure on malaria prevention should be considered as an investment by the households.

A direct effective intervention that can reduce the out of pocket expenditure is health insurance. Coverage should be expanded to

include all the population sectors and especially the informal sector, which is comprised mainly of vulnerable groups of low socioeconomic status and residing in areas of high transmission.

It is also vital to improve the care seeking behaviour and encourage households to channel their expenditure more rationally; they should be informed that malaria can be treated effectively at governmental health facilities as in the private sectors and for less cost. More importantly and in the face of introducing new expensive therapy self-treatment should be discouraged to avoid development of resistance.

In order to insure rational use of drugs at health facilities, so as to avoid development of drug resistance which may necessitate even more expensive therapies, only laboratory confirmed cases should receive anti malarial treatment. As for facilities that lack laboratory facilities, malaria clinical algorithms should be developed.

Agreements with the private sector to provide malaria diagnosis services and treatment at lower rates will assist greatly in reducing service prices. This could be done through prescribing antimalarial drugs in generic names and through subsidies by the government and donors for reagents and antimalrial drugs provided by the private sector.

As the out-of-pocket expenditure on treatment of simple malaria represents only one aspect of the economic burden of malaria on households, studies to quantify the indirect cost of malaria through loss of productive time, and taking into consideration malaria cases treated on an inpatient bases, should be conducted to reflect the whole burden that falls on households.

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APPENDIX

بسم الله الرحمن الرحيم

قسم طب المجتمع

2005/07/14 12:07 مكلية الطباعة الأخيرة جامعة الخرطوم

دراسة العبء الاقتصادي للملاريا على سكان ولاية الخرطوم خلال موسم الملاريا 2003م

تقوم وزارة الصحة بعمل دراسة لقياس العبء الاقتصادي للملاريا و البيانات التي ستقدمها لنا ستساعد كثيرا القائمين على أمر مكافحة الملاريا كما ستفيدك أنت بالتالي عزيزنا المواطن، كل البيانات التي ستدلي بها ستكون سرية و لن يطلع عليها أحد.

استبيان 1 (الأسرة)

الرقم	السؤال	الخيارات	الإجابة
.1	الحي		
.2	المحلية (المعتمدية)		
.3	مكان السكن	1/ حضري 2/ ريفي 3/ معسكر	
.4	المنطقة	1/ بحري 2/ امدرمان 3/ الخرطوم	
.5	المستوى التعليمي لرب الأسرة	1/ امي 2/ ابتدائي 3/ أساس 4/ متوسط 5/ ثانوي 6/ جامعي 7/ فوق الجامعي 8/ خلوة 9/ محو أمية	
.6	وظيفة رب الأسرة	1/ موظف حكومي 2/ موظف قطاع خاص 3/عامل باجر ثابت 4/ عامل باليومية 5/أعمال حرة 6/ معاش 7/لا يعمل 8/ أخرى حدد	
.7	عدد أفراد الأسرة		
.8	هل توجد سيارة بالمنزل	1/ نعم 2/لا	
.9	هل أصبت أو أي من أفراد أسرتك بالملاريا خلال الأسبوعين الماضيين؟	1/ نعم 2/ لا	
.10	في حالة الإجابة نعم، كم عدد المرضى(اكتب صفر في حالة عدم وجود مرضى)		
.11	ماذا تفعلون عادة لعلاج الملاريا؟	1/ علاج بلدي 2/ علاج ذاتي 3/ نذهب للفحص من دون استشارة طبيب 4/ نذهب لمؤسسة علاجية 5/ نتجاهل المرض 6/ أخرى حدد	
.12	هل استعملت أي من طرق الوقاية من الملاريا خلال السنة الفائتة؟	1/ نعم 2/ لا	

إذا كانت الإجابة نعم في السؤال أعلاه الرجاء أملا الجدول التالي:

	طرق الوقاية المستعملة	1/ نعم 2/لا	التكلفة
12	ناموسيات		خلال السنة الفائتة جنيه
13	ناموسيات مشبعة		خلال السنة الفائتة جنيه
14	رش داخلي للمنازل		خلال السنة الفائتة جنيه
15	قتل اليرقات(ردم البرك و تصريفها)		خلال السنة الفائتة جنيه
16	نمليات على النوافذ		خلال السنة الفائتة جنيه
17	طاردات البعوض (مثل الدخان ، coils)		= 24Xخلال الأسبوعين الماضيين جنيه
18	بخاخات (مثل البف باف و فليت)		= 25Xخلال الأسبوعين الماضيين جنيه
	الجملة		جنيه

إذا كانت الإجابة في السؤال (11) أعلاه هي (لا) ما هو سبب عدم استعمال أي طريقة من طرق الوقاية من الملاريا؟

26/ سعرها غالي 1/ نعم 2/ ☐
27/ غير متوفرة 1/ نعم 2/ ☐
28/ مكان بيعها بعيد 1/ نعم 2/ ☐
29/ لا اعرف من أين اشتريها 1/ نعم 2/ ☐
30/ لا يوجد سبب 1/ نعم 2/ ☐
31/ لا اعرف ما هي حتى اشتريها 1/ نعم ☐
31/ أخرى حدد.....

33ما هو الدخل الشهري للأسرة؟

المصدر	الدخل
دخل رب الأسرة	
دخل افراد الأسرة الاخري	
تحويلات من الخارج	
ايجارات	
اخرى	
الجملة	

34. كم صرفتم على الاتي خلال الاسبوع الاخير؟

البند	المنصرف
طعام و شراب	
وقود (غاز ، فحم)	
كهرباء + ماء	
مواصلات	
علاج (ملاريا + امراض اخرى)	
الجملة	

اسم جامع البيانات:.....

بسم الله الرحمن الرحيم

قسم طب المجتمع

كلية الطب – جامعة الخرطوم

استبيان رقم 2(المرضى)

رقم المنزل: ..... رقم المريض:.....

الرقم	السؤال	الخيارات	الإجابة
.1	نوع المريض	1/ ذكر 2/ أنثى	
.2	عمر المريض		
.3	اقرب وحدة صحية	1/ مستشفى حكومي 2/ مركز صحي حكومي 3/ شفخانة 4/ مركز منظمة طوعيـة 5/ عيـادة خاصة 6/مستشفى خاص 7 / معمل خاص	
.4	المـ ـستوى التعليمـ ـي للمريض	1/ أمي 2/ خلوة 3/ أساس 4/ ابتدائي 5/ متوسط 6/ ثانوي 7/ جامعي 8/ فوق جامعي 9/محـو أمية	
.5	مهنة المريض	1/ موظف حكومي 2/ موظف قطاع خاص 3/ مزارع 4/ أعمال حرة 5/ عامل باجر ثابت 6 / عامل باجر غير ثابت (يومية) 7/ ربة منزل 8/ لا يعمل 9/ طالب 10 / طفـل دون سـن المدرسـة 11/بالمعاش 12/أخرى (حدد)	
.6	هل لديك تأمين صحي؟	1/ نعم 2/ لا 3/ المؤسسة او الشركة التي اعمل بها تدفع تكلفة العلاج	
.7	كيف تم تشخيص المرض؟	1/ نتيجة فحص الدم الموجبة (الرجاء إبراز نتيجة الفحص) 2/ تشخيص اكلينيكي في مؤسسة صحية 3/بواسطة الصيدلي 4/ لم يتم تأكيد التشخيص (شخص نفسه بنفسه) 5/ أخرى	

8.اذا كان التشخيص لم يتم تأكيده هل أصبت بأي من الاعراض الاتية؟

1/ حمى	1/ نعم	2 /لا		6/ حرقات البول	1/ نعم	2 /لا	
2/ صداع	1/ نعم	2 /لا		7/ ألم بالحلق	1/ نعم	2 /لا	
3/ استفراغ	1/ نعم	2 /لا		8/ ألم بالأذن	1/ نعم	2 /لا	
4/ عرق	1/ نعم	2 /لا		5/ سعال	1/ نعم	2 /لا	

لا تجب على هذا السؤال

1/ احتمال الاصابة بالملاريا اكبر 2/ احتمال الاصابة بالملاريا اقل

جدول1

السؤال	الخيارات	التصرف الأول	التصرف الثاني	التصرف الثالث	التصرف الرابع	التصرف الخامس
9.ماذا فعلت بخصوص مرضك؟	1/ أخذت علاج ذاتي 2/ أجريت فحص الدم من غير استشارة طبيب 3/ ذهبت الى مؤسسة علاجية 4/ تجاهلت المرض كليا 5/ ذهبت لمعالج تقليدي 6/ أخرى (حدد)					
10. في حالة الإجابة 1,2،3 و 5 في السؤال (9) أعلاه بعد كم من ظهور الأعراض؟ (اكتب صفر في حالة التصرف في نفس يوم ظهور الأعراض)؟						
11. في حالة التأخير أكثر من يوم واحد، ما هو السبب؟	1/ لم توجد نقود 2/ انتظرت لاري إن كانت الحالة تزول من تلقاء نفسها 3/ أخرى حدد 4/ لا ينطبق					
12. في حالة تجاهل المرض، ما هو السبب؟	/ لا املك نقود للعلاج 2/ أخرى حدد 3/ لا ينطبق					
13. في حالة الذهاب لمعالج تقليدي ، ما هو السبب؟	1/ ارخص من المؤسسة الصحية 2/ المؤسسة العلاجية بعيدة 3/ العلاج البلدي افضل 4/ جربت العلاج الطبي بلا فائدة 5/ أخرى (حدد) 6/ لا ينطبق					
14 في حالة العلاج الذاتي ماهو السبب ؟	/ لتقليص التكلفة 2/ أنا اعرف أنها ملاريا 3/ المؤسسة العلاجية بعيدة من المنزل 4/ أخرى (حدد) 5/ لا ينطبق					
15.في حالة العلاج الذاتي أي نوع من العلاج أخذت؟ اذكر كل الأدوية التي اخذتها	1/ حقن ملاريا (حقن كلوروكوين) 1/ نعم 2/ لا 3/ لا ي					
	2/ حبوب ملاريا (حبوب كلوروكوين) 1/ نعم 2/ لا 3/ لا ي					
	3/ حقن زيتية (حقن ارتميش) 1/ نعم 2/ لا 3/ لا ي					
	4/ حبوب فانسدار 5/ بنادول أو اسبرين 1/ نعم 2/ لا 3/ لا ي					
	5/ شراب 1/ نعم 2/ لا 3/ لا ي					
	6/علاج بلدي 1/ نعم 2/ لا 3/ لا ي					
	7/ اخرى حدد					
16.من أين حصلت على الدواء للعلاج الذاتي؟	1/ من الصيدلية 2/ لدينا مخزون من الإصابات السابقة 3/ أخرى حدد 4/ لا ينطبق					
17.صف كيف أخذت علاج الملاريا للعلاج الذاتي؟	1/ جرعة مكتملة 2/ جرعة غير مكتملة 3/ لا ينطبق					
18. في حالة الذهاب لمعمل للفحص من غير استشارة الطبيب ما هو السبب؟	1/ لتقليل تكلفة العلاج 2/ لا توجد مؤسسة علاجية قريبة 3/ اعرف انها ملاري و اريد التأكد 4/ اخرى حدد 5/ لا ينطبق					
19. ماذا كانت نتيجة الفحص	1/ موجب 2/ سالب 3/ لا ينطبق					
20. ماذا فعلت بعد عمل الفحص في المعمل	1/ اخذت علاج الملاريا 2/ ذهبت لمقابلة طبيب 3/ اخرى حدد 4/ لا ينطبق					

السؤال	الخيارات	التصرف الأول	التصرف الثاني	التصرف الثالث	التصرف الرابع	التصرف الخامس
21. اذا اخذت علاج ملاريا ذاتي ما هي الادوية التي اخذتها؟(بعد فحص المعمل)	1/ حقن ملاريا (حقن كلوروكوين) 1/ نعم 2/ لا 3/ لا ي					
	2/ حبوب ملاريا (حبوب كلوروكوين) 1/ نعم 2/ لا 3/ لا ي					
	3/ حقن زيتية (حقن ارتميثر) 1/ نعم 2/ لا 3/ لا ي					
	4/ حبوب فانسدار 1/ نعم 2/ لا 3/ لا ي					
	5/ بنادول أو اسبرين 1/ نعم 2/ لا 3/ لا ي					
	5/ شراب 1/ نعم 2/ لا 3/ لا ي					
	6/علاج بلدي 1/ نعم 2/ لا 3/ لا ي					
	7/ اخرى حدد					
22. من اين تحصلت على العلاج الذاتي؟ ؟(بعد فحص المعمل)	1/ صيدلية 2/ مخزون في البيت 3/ دكان 4/ اخرى حدد 5/ لا ينطبق					
23. صف كيف اخذت علاج الملاريا للعلاج الذاتي؟ ؟(بعد فحص المعمل)	1/ جرعة مكتملة 2/ جرعة غير مكتملة 3/ جرعة اكثر من اللازم 4/ لا ينطبق					
24. في حالة ذهابك لمؤسسة علاجية الى أين ذهبت؟ (يشمل السؤال الذين اجروا فحص المعمل من غير استشارة)	1/ مستشفى حكومي 2/ مركز صحي حكومي 3/ شفخانة 4/ مركز منظمات 5/ عيادة خاصة 6/ مستشفى خاص كمريض داخلي 7/ أخرى حدد 8 / لا ينطبق					
25. في حالة الذهاب لمستشفى هل تم ادخالك للمستشفى (للعنبر)	1/ نعم 2/ لا 3/ لا ينطبق					
26. في حالة الذهاب لمؤسسة علاجية حكومية او تابعة للمنظمات التطوعية، ما هو السبب؟	1/ لأنها رخيصة 1/ نعم 2/ لا 3/ لا ين					
	2/ لأنها الأقرب للمنزل 1/ نعم 2/ لا 3/ لا ين					
	3/ تكلفة الترحيل لها اقل 1/ نعم 2/ لا 3/ لا ين					
	4/مسكن فيه بالتأمين الصحي 1/ نعم 2/ لا 3/ لا ين					
	5/ أخرى حدد					
27.في حالة الذهاب لمؤسسة علاجية خاصة ، ما هو السبب؟	1/ نفقات الذهاب لمؤسسة حكومية غالية 1/ نعم 2/ لا 3/ لا ين					
	2/ لان المؤسسة الحكومية مزدحمة 1/ نعم 2/ لا 3/ لا ين					
	3/ لان المؤسسة الحكومية بعيد 1/ نعم 2/ لا 3/ لا ين					
	4/ لان الاهتمام اكبر في المؤسسة الخاصة1/ نعم 2/ لا 3/ لا ين					
	5/ المؤسسة الحكومية لا تعمل بالليل1/ نعم 2/ لا 3/ لا ين					
	6/الدواء غير متوفر في المؤسسة الحكومية1/ نعم 2/ لا 3/ لا ين					
	7/ اخرى حدد					

السؤال	الخيارات	التصرف الأول	التصرف الثاني	التصرف الثالث	التصرف الرابع	التصرف الخامس
28. هل تناولت الدواء كما تم شرحه لك بواسطة المعالج في المؤسسة العلاجية؟	1/ نعم 2/ لا، أخذت بعضه 3/ لا، أخذته فقط لبعض الوقت 4/ حتى الآن أخذته كما هو موصوف 5/ أخرى حدد 6/ لا ينطبق					
29. إذا كانت الإجابة في السؤال (28) أعلاه هو لا (الإجابة 2 أو 3) ما هو السبب؟	1/ النقود التي معي تكفي لشراء بعض من الدواء أو جزء من الجرعة 2/ لان بعض من الأدوية سببت أعراض جانبية 3/ لادخار الدواء لأفراد الأسرة الآخرين أو للإصابات القادمة 4/ لان الأعراض زالت 5/ أخرى 6/ لا ينطبق					
30. هل شفيت تماما بعد هذا التصرف (يشمل السؤال الجميع اذا كان العلاج ذلتي او في مؤسسة علاجية او بلدي او تم تجاهل المرض)؟	1/ نعم 2/ لا 3/ لا ينطبق					
31. ماذا تفضل لعلاج الملاريا بالنسبة للاشخاص الكبار؟	1/ حبوب 2/ حقن 3/ لا يوجد تفضيل 4/ أخرى حدد					
32. ماذا تفضل لعلاج الملاريا بالنسبة للاطفال؟	/ شراب 2/ حقن 3/ لا يوجد تفضيل 4/ أخرى حدد					

لكل من أنواع العلاجات اجب على الآتي: (جدول2)

التكلفة	علاج بلدي	علاج ذاتي	معمل فقط	مؤسسة علاجية	هل تم دفع ربع القيمة؟ او تم دفع قيمة العلاج بواسطة جهة العمل؟
33.تكلفة الترحيل					لا ينطبق
أ/للمريض					لا ينطبق
ب/للمرافق					لا ينطبق
ج/للصيدلية	لا ينطبق				لا ينطبق
جملة تكلفة الترحيل					لا ينطبق
34.تكلفة العلاج					
أ/مقابلة الطبيب	لا ينطبق	لا ينطبق			
ب/شراب أو أدوية ملاريا	لا ينطبق				
ج/حقن ملاريا و تشمل:	لا ينطبق				
1/ امبولات دواء	لا ينطبق				
2/حقن	لا ينطبق				
3/اجر الممرض	لا ينطبق				
ه/محليل وريدية	لا ينطبق				
ح/حقن استفراغ و تشمل:	لا ينطبق				
1/امبولات دواء	لا ينطبق				
2/حقن	لا ينطبق				
3/اجر الممرض	لا ينطبق				
ط/مخفضات حرارة و ألم (بنادول +اسبرين)	لا ينطبق				
جملة تكلفة الادوية	لا ينطبق				
35.فحوصات معملية	لا ينطبق	لا ينطبق			
36.رسوم دخول العنبر	لا ينطبق	لا ينطبق			
37.أطعمة مغذية و مشروبات					
38.دواء بلدي و أعشاب			لا نطبق	لا ينطبق	
39. أي منصرفات أخرى حدد					
الجملة الكلية (التكلفة المباشرة)					