FACTORS ASSOCIATED WITH SELF-MEDICATION WITH ANTIMALARIAL DRUGS IN GESIMA LOCATION, MASABA DISTRICT

BY

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DECLARATION

I declare that this report is my original work and has not been presented for a degree in any other university or institution.

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DEDICATION

This thesis is dedicated to all mankind, young and old, who believe in the power of their dreams. To my parents Loice and Daniel, who have always stood with me throughout my studies, to my dear wife Jane and our lovely daughter Michelle, for whom I have a reason to go on and ultimately to The Lord God Almighty the source of life, health and knowledge.

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ABSTRACT

Background: Inappropriate drug use in self-medication with antimalarial drugs leads to emergence of drug resistant pathogens, wastage of resources and poses serious health hazards such as adverse reactions and prolonged suffering. Self-medication with antimalarial drugs is rampant in the developing countries. Studies on the pattern of this practice lack in Kenya.

Study Objective: To determine the magnitude and evaluate the factors associated with self-medication with antimalarial drugs among adults in Gesima Location, Masaba District.

Specific Objectives:

To determine the magnitude of self-medication with antimalarial drugs

To identify the reasons for self-medication with antimalarial drugs

To determine the sources of self-medicated antimalarial drugs

To establish the legal status of drug outlets in Gesima location

***Study Area and Study Population*:** This study was carried out in Gesima location, Masaba district, Nyanza province. All adults above 18 years irrespective of their gender living in Gesima Location during the study period were considered. The study included 384 individuals.

Research design: This was a community based cross-sectional survey.

Research instruments: Data were collected by structured questionnaires and schedule interviews.

Data analysis Data analysis was done using SPSS version 15 by frequency distribution models, Chi-square test, Spearman rank correlation, logistic regression model and parametric test (t-test) after data coding.

Results: This study established that 83.1% of the adults sampled self-medicated with antimalarial drugs whenever they suspected to be suffering from malaria. There was a significant negative correlation between the number of suspected malaria episodes and the practice of self-medication. The main reasons given by the respondents for this practice were convenience (87%), lower cost (83%) and that it saved time (76.4%). Only 3% of the self-medicated antimalarial drugs were Artemisinin-based Combination Therapies, the government's first line drug at the time of this study. Young age, medium income levels and household size were the socio-economic factors found to be associated with the practice in this study. Sources of antimalarial drugs used for self-medication were general shops, drug shops and mobile drug vendors. All sources selling antimalarial drugs in Gesima location had no legal mandate to stock and dispense these drugs.

Conclusions: There was a high magnitude of self-medication with antimalarial drugs among adults of Gesima location.

Recommendations: This study reported a high magnitude of self-medication with antimalarial drugs in Gesima Location. With the recorded evidence of high levels of resistance to most of the antimalarial drugs used for self-medication in the location, there is need for the training of the informal medicine sellers to become effective and safe providers of antimalarial drugs. Public education activities on the importance of seeking healthcare services from qualified professionals are also necessary and the government needs to strengthen the regulatory control of the stocking and dispensing of antimalarial drugs.

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DEFINITION OF KEY TERMS

Self-Medication: The use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms without a health care professional's advice

Health Care Professional: An Organization or person who delivers proper health care in a systematic way professionally to any individual in need of health care services

Drug Policy: Any policy that affects the use and application of drugs including legislative drug policies, insurance company drug policies and hospital drug policies

Antimalarial Drug: Conventional medicines that prevent or treat malaria

General Shop: Any general retail outlet stocking and selling antimalarial drugs in the location together with other general use items

Drug Shop: Any shop stocking and selling conventional medicines without general use items

LIST OF ABBREVIATIONS

WHO:	World Health Organisation
UNICEF:	United Nations Childrens' Fund
CQ:	Chloroquine
AM:	Antimalarial
AQ:	Amodiaquine
CQ:	Chloroquine
S/P:	Sulphadoxine-Sulphalene/Pyrimethamine
AL:	Artemether-Lumefantrine
ACT:	Artemisinin-Based-Combination Therapy
GoK:	Government of Kenya
MoH:	Ministry of Health
DoMC:	Division of Malaria Control
KNMS :	Kenya National Malaria Strategy
POM:	Prescription Only Medicine
POD:	Pharmacy Only Drug
NSAIDS:	Non-Steroidal Antinflammatory Agents
RBM:	Roll Back Malaria
EANMAT:	East Africa Network for Monitoring Antimalarial Treatment
NCLA:	National Consumer League Association
AEGSP:	Association of European Self Medication Industry
HMIS:	Health Management Information Systems
KDHS:	Kenya Demographic Health Survey

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

Malaria continues to be a leading cause of death and disability (Snow *et al.,* 2005), and every year there are over 250 million clinical cases occurring in more than 90 countries globally, with more than eighty five per cent of them occurring in Sub-Saharan Africa among the world's poorest people (WHO, 2010). Of the four species of malaria causing parasites, *Plasmodium falciparum* is responsible for most of the deaths, 1.5 to 2 million a year, ninety per cent being in African children (WHO, 2010).

Malaria is the leading cause of morbidity and mortality in Kenya, and over 70% of Kenyans (approximately 27 million people) are at risk of infection (DoMC, 2009). Malaria is responsible for approximately 30% of outpatient visits requiring more than 9 million out-patient treatments at health facilities each year, and 19% of all hospital admissions (DoMC, 2009). 3.5 million children under the age of 5 are at risk of infection while at least 14,000 children are hospitalized annually for malaria. Each year, there are an estimated 34,000 deaths among children under 5 (WHO, 2006). This death toll, high though it may be, has been held in check to some extent by the availability of cheap and reasonably effective antimalarial drugs (Olliaro *et al.,* 2001). However, the emergence of drug-resistant *Plasmodium falciparum* has begun to erode this balance. Chloroquine (CQ) resistance is now widespread, and sulphadoxine/pyrimethamine (SP) resistance has been well established in South East Asia and parts of Latin America (Krogstad, 1996).

In Africa, there is clear evidence that mortality increased significantly as a direct consequence of rising chloroquine resistance (Snow *et al.,* 1999). Several studies confirmed this trend. In Senegal, data from sentinel demographic surveillance systems indicated that among populations where low levels of malaria mortality had previously been achieved by means of effective health care delivery, child mortality attributable to malaria increased by as much as six-fold between 1990-2002. This increase in mortality can be correlated to increase in levels of CQ resistance. Hospital studies in various African countries have documented a two- to three- fold increase in malaria deaths and hospital admissions for severe malaria, an increase which was also related in time with the emergence of chloroquine resistance (Trappe, 2001). In Thailand, SP's had a useful lifespan of just 5 years (Looareesuwan *et al.,* 1992) while in east and central Africa and parts of the Amazon basin, SP resistance has become a major public health problem (Gorrison *et al.,* 2000, Kublin *et al.,* 2000, Vasconcelos *et al.,* 2000).

In Kenya, chloroquine was the mainstay drug for uncomplicated *Plasmodium falciparum* infections since its introduction in the 1930's (Shretta *et al.,* 2000). In 1978, confirmed cases of chloroquine-resistant infections were first reported in non-immune tourists to Kenya and Tanzania (Fogh *et al.,* 1979, Faelmann *et al.,* 1981, Peterson *et al.,*1981) and semi-immune Kenyans in 1982 (Spencer *et al.,* 1982). Thereafter, levels of resistance in Kenya escalated with the first case of resistance at the RIII level reported in a Kenyan infant in 1985 (Oloo *et al.,* 1986). In 1998, chloroquine was officially replaced as the first-line malaria therapy with a combination of Sulphadoxine-Sulphalene/Pyrimethamine (SP).

By mid 2003, there was convincing evidence that SP was failing and had to be replaced because of the rising multidrug resistance by the *Plasmodium falciparum* parasites to Sulphadoxine-Pyrimathamine drugs and other commonly available antimalarial drugs (Amin *et al.,* 2007, Esamai *et al.,* 2004). Due to this, the Government of Kenya officially made the switch to Artemisinin-based-combination therapy (ACT) as the first-line antimalarial drug in 2004 (Amin *et al.,* 2007).

Antimalarial drug resistance is exacerbated by a number of factors including abuse, underuse or misuse, poor patient compliance, and poor quality of available drugs. Self-medication with antimalarial drugs enhances the effects of these factors as there is lack of clinical evaluation of the condition by a trained medical professional (Hamel *et al*., 2001). In developing countries, easy availability of a wide range of drugs coupled with inadequate drug distribution systems and rising costs result in increased proportions of self-medicated drugs compared to prescribed drugs (Shankar *et al.,* 2002).

Gesima Location is a remote highland area in western Kenya lying in one of the districts with the highest malaria incidences in the country during the wet seasons of the year, normally between April-July and October-November, the long and short rain seasons respectively. The location lies within the newly created Masaba District in the rural highlands of western Kenya and is sub-divided into two sub-locations namely Riamoni and Nyatieno and has a total of 39 villages. The location is predominantly occupied by the Ekegusii speaking community, and has a hilly topography lying at an altitude of 1800m above the sea level.

Agriculture is the economic mainstay of the location, accounting for 66% of all economic activities. Tea, pyrethrum and passion fruit farming are the main cash crops grown whereas maize, beans, sorghum, finger millet and dairy farming are for subsistence purposes. According to the projected Kenya population and housing census of 1999, the total projected population of the location by the year 2008 was estimated to be 22,304, with a total of 4,589 households (GoK, 1999). The location has three health facilities including one government health centre, one mission dispensary run by the Seventh-day Adventist Church and a private health centre. It has 5 drug shops and 56 general village shops which stock and dispense drugs of different types. As per the Nyamira district development plan (1997-2001), many health facilities in the district require rehabilitation, staffing and equipping. Infant mortality rate in the district stands at 65 per 1000 live births. The major cause of morbidity and mortality is malaria which accounts for 40% of all out patient cases in the health facilities in the district (Ministry of Planning and National Development, 2007). It is against this backdrop that this study aimed at investigating the extent of self-medication with antimalarial drugs in Gesima Location and the factors associated with this practice.

1.2 Problem Statement

Self-medication with antimalarial drugs is widely practiced around the world (Foster, 1995). A major shortfall of self-medication is the lack of clinical evaluation of the condition by a trained medical professional, which could result in missed diagnosis and delays in appropriate treatments (Hameel *et al.,* 2001). This is likely to lead to progression of the disease state into more severe stages which could be fatal. When complicated stages develop, it can also result in hospital admissions thus furthering costs of care and increasing pressure on the healthcare system (Enserik *et al.*, 2000,

Ridley *et al*., 2002). Self-medication could also result in use of the antimalarial drug for the wrong indication, consumption of the drug over a longer period than recommended and consumption of doses substantially higher or lower than recommended. Further, inappropriate self-medication with antimalarial drugs also results in wastage of resources, increased resistance to pathogens, and generally entails serious health hazards such as adverse reactions and prolonged suffering (Kiyingi *et al.,* 1993). This practice is therefore a major public health concern which is likely to further complicate and retard the developments so far made in fighting malaria. Information available from Gesima health centre showed that most patients treated for malaria at the institution normally reported having already used antimalarial drugs obtained from the local drug and general shops and only came to the health centre after their condition did not improve or when it deteriorated. Gesima Location has a high number of home based mortalities and there is a high suspicion that some of these deaths could be related to inappropriate self-medication with antimalarial drugs.

1.3 Justification of Study

One of the principal problems in evaluating the impact of self-medication on antimalarial drug resistance is the lack of information about the extent of the practice of this habit. It has been shown that overall, self-medication in modern pharmaceuticals seems to be a field in which information is scarce (Bi *et al.*, 2000) and in particular, specific systematic studies on the distribution and self-use of antimalarial drugs in third world countries are lacking, (Worku *et al.*, 2003). The Kenya government in 2004 changed the malaria treatment policy from SP to Artemisinin-based-combination therapy (ACT). However, these drugs are relatively expensive in the private market, costing approximately US$ 1.5-8.00 per course, in a continent where most of the population lives on less than US$

1.00 per day and in addition there are always practical difficulties in implementing any change in policy and the uncertainties about future costs, risks and benefits (Fevre *et al.*, 1999, Goodman *et al.*, 1999). There are also broader costs at the household and macroeconomic levels (Sachs *et al.*, 2002) and loss of confidence in a health system that fails to deliver a cure (Yeung *et al.*, 2004). In 2006, the Government of Kenya explicitly stated Artemether-Lumefantrine (AL) a form of an ACT antimalarial drug, as the first line treatment for uncomplicated malaria (Amin *et al.*, 2007). Currently, AL is the only registered co-formulated ACT that is produced to internationally recognized standards. However, it has the disadvantage of requiring a twice-a-day dose and needs to be taken with fat to ensure adequate absorption (Yeung *et al.*, 2004). This is likely to hamper appropriate adherence to the treatment regimen which will contribute to the development of drug resistance. Policy makers should be concerned if there is rampant self medication with this first line antimalarial drug and studies on the patterns of antimalarial drug self-medication are necessary in order to provide the government and health care regulators with vital information so as to make the necessary interventions to avoid the new first-line treatments facing the same fate as CQ and SP's.

Currently, there is no available research conducted to reveal the extent of self-medication within Masaba district. Therefore, it is hoped that this research will show the magnitude of self-medication with antimalarial drugs so as to initiate intervention by the concerned authorities and the community as well. The objective of this study was to assess the practice, pattern and extent of self-medication with antimalarial drugs among adults living in Gesima Location.

1.4 Research Questions

- What is the magnitude of self-medication with antimalarial drugs in the study population?
- What are the major reasons for self-medication with antimalarial drugs?

1.5 Study Objective

To determine the magnitude and evaluate the factors associated with self-medication with antimalarial drugs among adults in Gesima Location, Masaba District

1.6 Specific Objectives

1. To determine the magnitude of self-medication with antimalarial drugs among adults in Gesima location
2. To identify the reasons for self-medication with antimalarial drugs
3. To determine the sources of self-medicated antimalarial drugs
4. To establish the legal status of drug outlets in Gesima location

CHAPTER TWO

2.0 LITERATURE REVIEW

Self-medication can be defined as the use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms without a health professional's advice (WHO, 2000). A number of reasons could be enumerated for the rise of self medication. The shift in the pattern of disease towards chronic ones (from 30% to 80% in 40 years) with attendant shift from cure to care is often mentioned while the inadequacies of health care systems in developing countries, rising cost and issue of curative stance drugs have also been found to be contributing factors (Clavinjo, 1995; Yayehyirad, 1997). The use of drugs from informal sectors such as open markets and village kiosks encourage the practice of self-medication (Worku *et al.*, 2003). This practice is rampant in developing countries where unlike in the developed countries, illegal purveyors of drugs are common alongside some practitioners, who are a further source of irrational and potentially dangerous drug use habits (Worku *et al.*, 2003). Foster found that unofficial drug sellers in markets, streets and village shops account for as much as half of antimalarials distributed in many developing countries (Foster, 1991). In Kenya, according to the Pharmacy and Poisons Act (Chapter 244 of the Laws of Kenya), not all cadres of health workers can prescribe or dispense Part I poisons (Prescription Only Medicines (POM). Only Medical doctors, dentists and clinical officers are allowed to prescribe and only graduate pharmacists can dispense all prescription drugs. Pharmaceutical technologists can only dispense Part II poisons (Pharmacy only drugs) and can only dispense part I poisons under the supervision of a graduate pharmacist (GoK, 1988). However, many of the effective antimalarial drugs available in the country currently are POM drugs, including the government first-line drug

Artemether-Lumefantrine. In a circular released in January 2008, the Pharmacy & Poisons Board stated that SP's and Amodiaquine are no longer approved for the treatment of malaria unless they are in combination with an artemisinin derivative (PPB, 2008). However these drugs are still rampant in drug outlets across the country including in the informal drug sector. Since there has been found to be a widespread proliferation of untrained private medicine sellers in many settings due to socio-economic and geographic barriers to treatment through government clinics and hospitals (Mills *et al.,* 2002), there is a high suspicion that many antimalarial drugs are currently dispensed by people otherwise not authorized to do so by the law. Further, the use of antimalarials through the health services is often poor and drug shortages are common (Foster, 1991).

2.1 Individual drug use behaviours leading to self-medication and drug misuse

According to Hardon *et al* (2004) there are a number of individual drug use behavior that promote self medication and drug misuse. These are often linked to the multi-layered environment that shapes them and can be discussed under these levels;

- Household level
- Community level
- Health Institution level
- National level
- International level

2.1.1 The Household Level

The manner in which drugs are used is influenced by individual beliefs about them. These beliefs are in turn shaped by members of one's family and friends.

Factors at this level include;

- Perceived need for Drugs

  People have lost their trust in the body's ability to fight disease without the use of drugs, even for self-limiting conditions. They take drugs not only to treat the symptoms of illness but because they believe they also need the drugs to stay healthy (Hardon *et al.,* 2004)

- Ideas about efficacy and safety

  Individuals use drugs according to their own perceptions about drug safety and efficacy. Studies have shown that people believe that safety and efficacy are determined by a number of factors including the colour and the shape of the drugs. The newness of a drug can also play a role as a new drug is thought to be more effective (Hardon *et al.,* 2004).

- Drug Consumption Roles

  Drug misuse could also depend on the role people play in the family with regard to the purchase, administering and deciding which drug to use. In the Philippines, women decide what drugs to give to their children after consulting with neighbours and relatives (Hardon, 1991). In most communities in Kenya, the household drug consumption roles are likely to be strongly influenced by the male head of the house.

- Uncertainty resulting in Poly-Therapy

  People are often unsure of the illness afflicting them and as a result try various drugs at the same time and often combine modern drugs with traditional remedies or they consult various practitioners and take the drugs advised concurrently (Hardon *et al.,* 2004).

- Literacy levels of the Consumer

  This determines the amount of information that can be understood from drug package inserts which is essential for proper drug use. If this information is not understood well, then the likelihood of drug misuse increases (Hardon *et al.,* 2004) while on the other hand, availability of these information can enhance self medication as the patient reads the indications and prescribes for him/herself depending on the deemed illness.

2.1.2 The Community Level

The community is the immediate context in which individuals and families deal with their health problems. People share information on various therapies creating and reinforcing existing drug cultures. They also rely on local supplies of drugs (Hardon *et al.,* 2004).

- Drug Use Cultures

  There is usually a clear local drug use culture of which some may be inappropriate. People get these drugs from local suppliers like shops, supermarkets and markets (Hardon *et al.,* 2004).

- Drug Supply Systems

  The drug supply system plays a role in drug misuse. Public health managers often assume that drugs are only obtained from public facilities such as clinics but this is not usually the case. Most studies on community drug use show that people tend to rely on informal channels (Hardon *et al.,* 2004). These channels may not be concerned with the appropriate use of drugs therefore leading to drug misuse.

- Information Channels

  Information on the use of drugs is an important tool that can promote inappropriate use of drugs. Advertisements on the print and electronic media, educational sessions organized as part of primary health care programs, community health workers, drug sellers in small shops or markets and popular health books are all possible sources of information on drug use (Hardon *et al.*, 2004).

2.1.3 The Health Institution Level

Health facilities influence consumer drug use through several ways. People tend to recall advice given to them and use it in later episodes of self-medication. If the information was incomplete, then misuse is more likely (Hardon *et al.,* 2004). Further, it has been found that in developing countries, health facilities tend to suffer from shortages of various drugs. Due to this, people tend to avoid them and go straight to the shops or informal channels when they or a family member falls sick. Some of these channels bypass the health worker and thus increase the likelihood of inappropriate drug use.

2.1.4 The National Level

In most developing countries, drugs represent the second largest government health expenditure after personnel costs. Consumer use of drugs is affected by the provision of essential drugs and regulation of the supply and promotion of drugs by the private sector (Hardon *et al.*, 2004). Where the implementation of essential drug policies is poor and the drug supply in the private sector is unregulated, people are more likely to inappropriately use these drugs. It has also been seen that in many countries, essential drug policies tend to emphasize drug procurement, supply and appropriate use by

healthcare workers while ignoring promotion of rational drug use by consumer. This in turn leads to inappropriate self-medication of these drugs. Another factor influencing drug use is drug promotion. Drug promotion tends to create a demand for drugs. It defines illness conditions that need treatment, promotes the idea that drugs are the best remedy as opposed to non-drug alternatives and it tends to emphasize a drug's efficacy while minimizing possible health risks (Hardon *et al.,* 2004). Drug promotion direct to the consumer is becoming increasingly common in Kenya. Other factors include the lack of strong consumer advocacy programs in developing countries and the negative role played by the media as seen in unethical drug promotion by journalists in exchange for favours from pharmaceutical companies (Hardon *et al.,* 2004).

2.1.5 The International Level

Global Consumer Advocacy plays an important role at this level. Consumer advocacy is vital in promoting rational drug use. If it is weak, then inappropriate self medication tends to increase as policy makers will shift to other issues. The internet is also a new factor to be considered at this level. The internet is a good source of information about drugs for those who can access it but unfortunately, its lack of borders offers a wide audience for the marketing of certain drugs. This creates undue demand which may in turn lead to inappropriate self medication of drugs by consumers. The drive towards globalization and increasing adoption of free market economies in more parts of the world has increased the number of drugs available. Large numbers of different drugs make it difficult to ensure rational use of all of them thus leading to improper self medication and misuse of these agents (Hardon *et al.,* 2004).

2.2 Advantages of Responsible Self Medication

Responsible self medication is a term often used to emphasize the appropriate use of over-the-counter medicines by informed patients and consumers, with health care professional support where necessary (AEGSP, 2004). While health service funding in most countries is being re-examined, the broad benefits of self medication have been recognized. In 1995, the WHO Expert Committee on National Drug policies recognized that self-medication is widely practiced both in developed and developing countries. However, these medications may be approved as being safe for self-medication by the national drug regulatory authority. The committee further said that such medicines are normally used for the prevention or treatment of minor ailments or symptoms that do not justify medical consultation and in some chronic illnesses which after initial diagnosis and prescription, self medication is possible with the doctor retaining an advisory role (WHO, 1995). A draft guideline by the WHO based on the above criteria states some of the potential benefits of self medication as;

- Efficacy; Self medication can be of high efficacy if the drug taken treats the ailment it is supposed to.
- Reliability and safety; through experience, self medication gives the individual an opportunity to choose a drug that he/she knows will suit him/her. The scope and duration of self medication can also be kept within safe limits by the appropriate selection of approved indications, labeling texts, dosage strengths and forms and package sizes
- The recommended drugs for self medication normally have acceptable risks even when used for a longer duration or at dosages somewhat different from the recommended ones
- Making more drugs available for self medication ultimately ensures wider

availability of medicines

- The patient has a greater choice of treatment when he/she chooses the medicine
- There is a direct and rapid access to treatment
- Self medication gives the patients an opportunity to play an active role in their own healthcare programs
- There is an element of self-reliance in preventing or relieving minor symptoms or conditions
- There is some convenience on the part of the patient
- There is reduced cost, since the costs of clinical consulting are avoided or reduced (WHO, 1995).

At a macroeconomic level, responsible self medication can be seen as a strategy to reduce the pressure on the healthcare care services brought about by minor ailments given the limited resources in the developing countries. It can also increase the availability of healthcare to the community (Blenkinsopp *et al.,* 1996)

Drug distributors-pharmacists, pharmacy attendants, patent medicine stall keepers, and itinerant drug sellers-are an important source of primary care for people in many developing countries, and they often sell drugs without prescription. One recommendation that has been made to improve the practice of self medication is to train this group to require prescriptions for drugs purchases and asking them to refer customers for additional medical advice when appropriate. Continuing education for health workers has proved an effective intervention for controlling drug resistance by improving certain health outcomes by 5% to 20% among both private and public providers (Laxminarayan *et al.,* 2006). These education programmes can be aimed at enhancing the ability to diagnose the health condition, reducing unjustified prescriptions

and deflecting patient pressure to prescribe inappropriate drugs as well as use of multiple medications. In Kenya, since 2001, the Kenya National Malaria Strategy (KNMS) has supported the implementation of programmes targeting private sellers of OTC medicines and their clients within district malaria control activities (DoMC, 2001). The ACT antimalarial drug policy in Kenya proposed ultimate inclusion of private medicine sellers, depending on early experiences with the policy change (MoH, 2005). This is all in an effort to promote appropriate self medication and responsible use of over the counter medications in line with international strategies that see the private medicine sellers as an important target to promote appropriate self medication (WHO, 2005, DoMC, 2001).

2.3 Negative Effects of Self-Medication

Some drugs are generally more commonly self-medicated than others. Misconceptions about bowel habits have led to excessive laxative use (BNF, 2002). These agents tend to be misused by young females in Britain in an attempt to control weight and their excessive use may lead to hypokalemia and atomic non-functioning colon (Pates *et al.,* 2002). Antihistamines have also been found to be frequently self medicated by opioid abusers to control the symptoms of drug withdrawal or to reinforce the effects of opioids (Matheson *et al.,* 2005). The side effects of these drugs include headache, psychomotor impairment, and antimuscarinic effects such as urinary retention, dry mouth, blurred vision and gastro-intestinal disturbances. Another class found by previous studies to be highly abused is analgesics (NCLA, 2003). Analgesics are classified as either opioid analgesics or Non-steroidal anti-inflammatory agents (NSAIDS). Stomach bleeding caused by NSAIDS accounts for as many as 16,500 deaths and over 103,000 hospitalizations each year in the United States (NCLA, 2003). Aspirin may lead to

Reye's syndrome in children who are given the drug when suffering from viral infections like chicken pox. Cold and cough preparations are also frequently self medicated (AHFS, 1999). Expectorants, antitussives and sympathomimetics are all regularly used, without the health worker's advice. The latter are particularly important to note because they tend to cause rebound nasal congestion creating a cycle of dependence (AHFS, 1999). If antacids are used for a longer period than recommended, they may cause problems with acid-base balance, neurological disturbances and renal calculi. Aluminium hydroxide in some products may also lead to neuro-muscular problems and bone defects. Antiallergy skin preparations contain corticosteroids. These agents are often self-medicated in the treatment of acne which is a wrong indication as the most effective preparations are keratolytics, anti-microbials and abrasives. They are also used as skin lighteners and their prolonged topical usage leads to thinning of the skin, easy bruising and cutaneous atrophy (AHFS, 1999). The use of post coital emergency contraceptives is on the rise (AHFS, 1999). These drugs are for emergency situations but more and more young women are now using them as routine contraceptives, oblivious of the health risks this poses. Recent studies in Sudan, India, and Mexico show high prevalence of self-medication leading to misuse and contributing to the emergence of resistance to antibiotics (Worku *et al.,* 2003).

2.4 Negative Effects of Self-Medication with Antimalarial drugs

Inappropriate self-medication with antimalarial drugs leads to wastage of resources, increased resistance of the parasites and generally poses serious health hazards such as adverse reactions and prolonged suffering. Due to increased public education on malaria, people take antimalarial drugs when they experience symptoms like fever without getting diagnosis first (Hardon *et al.,* 2004). This irrational use of antimalarials without

prescription promotes the rise of drug resistance (Hameel, 2001). Antimalarial resistance is now one of the greatest threats to our ability to "roll back malaria" (Marsh, 1998; White *et al.,* 1999). The situation is spreading to previously unaffected areas with a remorseless increase both in prevalence and degree of drug resistance (Yeung *et al.,* 2004). Antimalarial drug resistance further extrapolates the burden of disease and consequences caused by malaria. These include anemia, maternal, infant and childhood morbidity and mortality, neurologic disability and economic and social costs (Snow *et al.,* 1999, Guyyatt *et al.,* 2001, Steketee *et al.,* 2001, Chima *et al.,* 2003). Patients infected with resistant strains are more likely to be sicker, to spend more time in the hospital and to die of infection than patients infected with non-resistant parasite strains (Laxminarayan *et al.,* 2006). Another important cost of resistance comes from the need to move to much more expensive second-line or third line treatments when first-line drugs fail (Laxminarayan *et al.,* 2006). Many governments in most developing countries have faced enormous difficulties in changing their antimalarial drug policies, especially when these changes involve moving from an inexpensive failing drug to a more expensive alternative (Shretta *et al.,* 2000, Kindermans *et al.,* 2002). In Kenya, the Ministry of Health (MOH) has had to change its first-line recommendations for the treatment of uncomplicated malaria twice since the inception of the Roll-Back-Malaria (RBM) initiative in Abuja in the year 2000, the first change being from CQ to SP in 1998 (Shretta *et al.,* 2000) and the second in 2004 from SP to ACT (Amin *et al.,* 2007). The process of implementation of these policy changes was of very high economic and political challenges (Amin *et al.,* 2007). The estimated cost of the latter policy change was estimated to be US$12.5 Million per year courtesy of the special deal in price arranged by the World Health Organisation (WHO) compared with the Ministry of Health's annual budget of slightly over US$ 10 Million (Kindermans *et al.,* 2002).

Regionally, the estimated cost for this policy changes was estimated at US$ 39.2 Million for Burundi, Rwanda, Kenya, Tanzania and Uganda, all of which except Burundi, are members of a regional malaria network called East African Network for Monitoring Antimalarial Treatment (EANMAT) (Kindermans *et al.,* 2002.) All these countries have high malaria incidences and high rates of resistance to CQ and SP in addition to being among the poorest in the world. There are also broader costs at the household and macroeconomic levels (Sachs *et al.,* 2002) and loss of confidence in a health system that fails to deliver a cure (Yeung *et al.,* 2004). Irrational intake of antimalarial drugs through self-medication is therefore a practice with major public health implications.

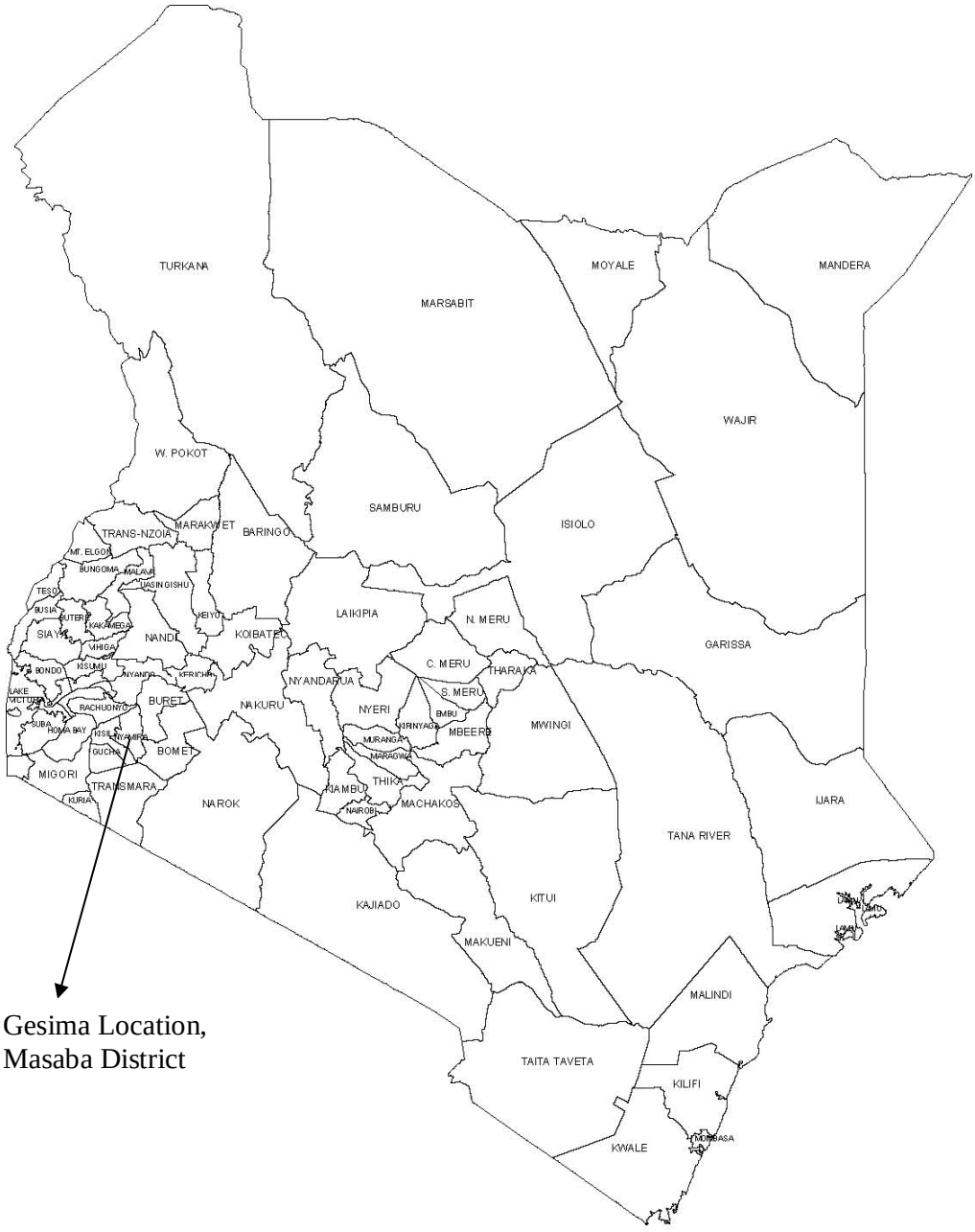
CHAPTER THREE

3.0 METHODOLOGY

3.1 Study area

This study was conducted in Gesima Location, Masaba district. The location is sub-divided into two sub-locations namely Riamoni and Nyatieno and has a total of 39 villages. According to the projected Kenya Population and Housing Census of 1999, the total population of the location is estimated to be 22,304 by the year 2008 with a total of 4,589 households (CBS, 2002). The location has three health facilities including one government health centre, one mission dispensary run by the Seventh-day Adventist Church and a private health centre. It has 5 drug shops and 56 general retail shops which stock and dispense drugs of different types. Figure 3.1 below presents the Kenyan map showing the location of Gesima location while Appendix IV shows the layout of villages within Gesima location.

Figure 3.1: Map of Kenya showing location of Gesima Location



Gesima Location,
Masaba District

Map 1.1.2 : Map of Kenya showing administrative boundaries
(United Nations, 2008).

3.2 Study Design

This was a community-based cross sectional survey and involved investigations regarding self medication practices with antimalarial drugs of the community members for the preceding six months in order to find out the various factors associated with the practice.

3.3 Study Population

The study considered all adult individuals aged above 18 years living in Gesima Location during the period of the study (April 2008-June 2008). This period was chosen because there is a high incidence of malaria in the location during this time of the year which coincides with the long rains. To get more information about the sources of the antimalarial drugs within the location, the study also considered all the drug shops and sampled general shops stocking and selling antimalarial drugs within Gesima Location.

3.4 Sample Size

The sample size was calculated using the Fishers Exact statistical formula for calculation of sample size:

$$n = \frac{Z^2(Px1-P)}{d^2}$$ where Z = Statistical Constant

d = Sampling Error

P = Estimated Magnitude of the self medication with antimalarial drugs among adults in Gesima Location

Since, there was no known magnitude of self medication with antimalarial drugs in Gesima location at the time of this study and in order to maximize the sample size, 50 % was used as the prevalence (p).

Thus at 95 percent confidence level, the sample size (n) was equivalent to:

$$n = \frac{1.96^2 x(0.50x0.50)}{(0.05)^2}$$

$$n = 384.16$$

3.5 Sampling Method

The sampling unit was the individual. Multistage random sampling was used to move from location to village level where 10 villages were randomly selected from the 39 villages in the location in an effort to sample at least 25% of the villages since they were less than 100 units in conformity with Peters (1986) formula for sample size calculation. Riamoni sub-location had a total 22 villages whereas Nyatieno sub-location had a total of 17 villages. Using proportional sampling method, 6 villages were sampled from Riamoni sub-location and 4 villages from Nyatieno sub-location. For Riamoni sub-location, this was done by first writing the names of all the 22 villages on small pieces of paper. These papers were then placed inside a closed container with a lid, the container was shaken, the lid opened and then the first six pieces of paper drawn from the container. The villages whose names were written on these pieces of paper were the ones selected to participate in the study. The same sampling procedure was used to identify the 4 villages in Nyatieno sub-location. Having identified the villages to participate in the study, consecutive sampling was then used to visit households within these villages in order to sample individuals to participate in the study. Households in Gesima location are located on family ancestral lands which normally run from the hill top to the stream down the valley, with each ancestral home separated from the other by a footpath. This makes sampling of the households possible within the setting. With the aid of the village elders, the number and location of households within each ancestral land were

established. This then paved way for house to house visits by the research assistants. A total of 38 respondents were to be interviewed in 9 villages which had an average of between 90 to 100 households and 42 in one village which had a household population of 130. Any adult member of the selected household who had suspected to have suffered from malaria in the preceding six months was enrolled to participate in the study. This was done until a total number of 384 respondents were interviewed. To get more information about the sources of the self medicated antimalarial drugs, questionnaires were administered on all the 5 drug shops in the location. 20 general shops were randomly sampled from the 56 general retail shops in accordance with Peters (1986) sample size calculation formula which recommends sampling of at least 25% of populations which are below 100 in number.

3.6. Inclusion Criteria

All adult individuals aged over 18 years who had suspected to have suffered from malaria over the past six (6) months were included in the study.

3.7 Exclusion Criteria

All adult individuals suffering from any illness at the time of the study were excluded from participating in the study. This was important because some of the questions asked would be related to the outcome of the treatment and therefore individuals currently on treatment could not answer all the questions in the questionnaire.

3.8 Data Collection and Management

Interviewer administered pre-tested questionnaires were used to collect the information. The pre-tests were done in ten households from one village which was excluded from

the study. The variables collected included socio-demographic and economic variables, questions on self-medication with antimalarial drugs such as health condition six months prior to the survey, action taken for the illness, the sources where the drugs were obtained from, the type of drug taken and reasons for self-medication.

Data were collected from all adults in the household who had suffered from malaria in the preceding six months period. A separate questionnaire was used whenever more than one person was found ill in a household. Income levels were determined by asking monthly salaries for employees, average monthly profit for business people and average daily income so as to make an estimate of monthly income for daily laborers. Total family income divided by the number of household members was used to quantify the income of housewives and the jobless. Ten locally trained research assistants were assigned to collect detailed information on self medication with antimalarial drugs for adults present in the household at the time of interview using a structured questionnaire. The ten research assistants and the Investigator understood and spoke the Ekegusii language. The research assistants were all university students taking science and medical related degree courses including Biochemistry (4), Bio-Medical Sciences (2), Laboratory Technology (2) Nursing (1) and Pharmacy (1). These data collectors were trained for a period of seven days by the investigator before commencement of the study. To ensure maximum accuracy of the results, strict supervision of the data collectors by the investigator was adhered to and the data collected checked for completeness and consistency before data entry.

3.9 Data collection tools

A structured pre-tested questionnaire was the quantitative data collection tools used to collect primary data from the respondents. This questionnaire was administered by the investigator and the ten (10) trained research assistants. To counteract the potential of reporting bias, the questionnaire was developed and validated from previous studies. The data collectors used drug charts containing samples of commonly used antimalarial drugs to aid recall and validate reports. Remaining drug packages or tablets were reviewed where possible. The adequacy of treatment was gauged in comparison to the national malaria treatment guidelines on antimalarial medicine use with CQ, AQ, SP and A.C.T (AL). This is due to the fact that despite chloroquine and sulphadoxine-pyrimethamine having been replaced as the first line treatment drugs for malaria, pre-study surveys showed that they were still widely stocked in many drug shops and general shops in Gesima location. The East African Pharmaceutical Loci regional drug index was used to establish the dosages of other antimalarial drugs which were not contained in the national treatment guidelines.

3.10 Data Analysis and Interpretation

Generated data was checked for inaccuracies and inconsistencies daily before double entry and verification using Statistical Programme for Social Sciences (SPSS 15) computer software. After data collection, responses to all the questionnaires were analyzed. To facilitate the analysis, the data processing exercise was commenced with the coding and entry of all the responses obtained using the SPSS version 15 package.

Descriptive statistics and non-parametric tests were used to analyze the data. Chi-square test is a statistical technique used to compare the differences between

categorical frequencies when data is categorical and is drawn from a population with uniform distribution in which all alternative responses are equally likely. Chi-square test of goodness of fit was used because the data the researcher collected was of the type one-variable-many-levels and was basically categorical frequencies of descriptions of views, opinions, perceptions, feelings and attitudes of the respondents towards self medication. Considering that there was a measure of degree of association between two or more variables (self-medication with antimalarial drugs and sociodemographic variables, economic variables, action taken for the illness, the sources where these were obtained from, the type of drug taken, reasons for self medication and result after self-medication) that were obtained from the same group of subjects, the researcher also employed the use of Correlation Analysis. Since some of the data was based on qualitative traits assuming qualitative variables through ordinations, Spearman Rank Correlation was suitable for this analysis. A logistic regression was also performed on a number of independent socio-economic variables found to influence self medication in previous studies. The regression was done using forward Wald and Wald Statistics used to determine the significant regression factors in the model. All data were analyzed at a confidence level of 95% or α =0.05 and degree of freedom depending on the particular variable sizes. When the P-value of any analysis was below 0.05 then the differences being analyzed were declared statistically significant otherwise no significant differences were recorded.

3.11 Ethical Considerations

The proposal was presented to the Institutional Research Ethics Committee (IREC) of Moi University for approval. The committee was informed of any changes in the methodology before implementation, and all effort was made to adhere to ethical

principles. Informed consent was sought from all participants including the local administration (chief, assistant chief, village elder), healthcare providers both public and private, respondents and their family members. They were all informed of the intent of the research, its potential benefits and their rights to withdraw from the study at any time as they wished. The participants were requested to participate in the study voluntarily and there was no payment, enticement or remuneration of whichever kind for participating. There was no harm to the respondents as a result of participating in this study. Information on the dangers and problems associated with self medication with antimalarial drugs was communicated to the respondents at the end of each interview to enable them understand the benefits of consulting a health care professional when suspecting to have a malaria attack. All personal information was kept confidential and anonymous and solely used for the purpose of this research.

CHAPTER FOUR

4.0 DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

In this chapter the findings have been highlighted, presented and discussed. The presentations of the results were done in figures, tables and synthesized texts. The first part presents the demographic data of the participants for this study. The discussion on socio-demographic factors is presented under the following sub-headings: relationships of the participant to the respondent, gender, age, marital status, levels of education and average house hold income of the respondents. The second part presents information concerning the magnitude of self-medication with antimalarial drugs in Gesima location. In the third section, logistic regression was performed on each of the socio-demographic factors and each significant factor further highlighted on how they were associated with self medication within the study area. The fourth part presents information concerning the reasons why self-medication is rampant among local community members in Gesima Location followed by a presentation on the findings about the sources of self-medicated drugs and lastly the legal status of drug outlets in Gesima location is determined.

4.2 Socio-demographic data of the respondents

Results showing the socio-demographic data of the respondents in Gesima Location are shown in Table 4.1. A total of 384 members of Gesima Location were interviewed and questionnaires filled during the survey.

Table 4.1: Socio-Demographic characteristics of the respondents

Demographic	Characteristics	Frequency	% Frequency
Participant/Respondent	Self	323	84.1
	Wife	11	2.9
	Husband	50	13
Sex	Male	216	56.3
	Female	168	43.7
Age	18-25	48	12.1
	26-35	33	8.5
	36-45	179	46.7
	>45	124	32.1
Marital status	Married	335	87.2
	Single	49	12.8
Levels of education	None	16	4.2
	Primary	152	39.6
	Secondary	200	52.1
	Post-Secondary	16	4.2
Employment status	Formal employment	7	1.8
	Informal employment	374	97.4
	Unemployed	3	0.8
Income Levels	< 1,000	18	4.7
	1,000-5,000	178	46.4
	5,001-10,000	167	43.5
	10,001-20,000	18	4.7
	>20,000	3	0.7

From a total 384 respondents, 323 (84.1%) were actual respondents who answered the questions for themselves as compared to 11 (2.9%) who were filling in the questionnaires on behalf of their wives or 50 (13%) on behalf of their husbands. This numbers were statistically different after performing a Chi-square test ($\chi^2 = 98.12$, df = 2, $p = 0.0002$).

Among the same respondents sampled, 216 (56.2%) were males while the rest (43.8%) were females. This gender distribution among the respondents was statistically significant subject to Chi-square test (χ^2 = 17.73, df = 1, p = 0.0032) indicating that the proportions of interviewed males was higher than that of the females.

Age distribution was statistically signigficant among the various categories of respondents (χ^2 = 126.91, df = 4, p = 0.0000). Majority of the respondents (about four fifth) were aged above 35 years while the least number of respondents were aged below 26-35 years.

Among the same number of sampled respondents, 335 (87.2%) were married while the remaining 49 (12.8%) were single. When the data was subjected to statistical test of deviation from the expected and observed, it was established that there was a statistically significant difference between the proportion of married and single respondents (χ^2 = 67.70, df = 1, p = 0.0001) indicating that the proportion of interviewed married people were higher than those who are single.

There was also a significant difference in levels of education among various respondents in Gesima Location (χ^2 = 34.75, df = 3, p = 0.0012). About a half had some level of secondary level of education. Slightly over one third of the respondents had primary education while similar proportion of 4.2% each had either no education at all or had university education.

Among the respondents sampled, 97.4% had informal employment while 1.8% were formally employed and close to 1% being unemployed. As a result, there were large significant differences in the average income earned by the respondents in Gesima Location (χ^2 = 114.61, df = 4, p = 0.0002). Majority of the respondents were earning between Kshs. 1000 to Kshs. 10000 per month. The proportion of those earning Kshs. 1000 to 5000 was similar to those earning Kshs. 5000 to 10000. However, those earning Kshs. below Ksh. 1,000 as well as above Kshs. 10,000 were few among the respondents sampled.

4.3 Magnitude of self-medication with antimalarial drugs

The first objective of the study was to determine the magnitude of self-medication with antimalarial drugs in Gesima location. To realize this objective, the researcher sought to determine whether the respondents who had suspected to have fallen ill with malaria over the preceding six months went to hospital to seek treatment or not. The results are presented in Table 4.2.

Table 4.2: Whether the respondents went to hospital when they suspected to be suffering from malaria

	Frequency	Percent
Went to hospital	20	5.2
Did not go to hospital	364	94.8
Total	384	100

The results in the table above indicate that when the respondents suspected to have contracted malaria, only 5% went to the hospital while the remaining about 95% did

not go to the hospital. It was necessary to find out what the respondents who did not go to hospital do. The results to this question are presented in Table 4.3.

Table 4.3: What the respondents who did not go to the hospital did when they suspected to be suffering from malaria

	Frequency	Percent
Went to traditional medicine man	26	7.1
Sought prayers	11	3.0
Did nothing	8	2.1
Self medicated	319	87.6
Total	364	100

There were varied actions taken by the respondents who did not go to hospital when they were thought they had contracted malaria. Some small proportions of individuals sought treatment from traditional medicine men in the villages, prayed or did nothing. Since the respondents concluded that they were suffering from malaria based on their self diagnosis, it is possible that the groups that sought prayers or did nothing at all did not actually suffer from malaria but had symptoms similar to the ones they experienced whenever they were sick with malaria. However, most of the respondents (87.6%) who did not go to the hospital when they suspected to be suffering from malaria resorted to self medication with antimalarial drugs.

The researcher further sought to establish if there was any relationship between the frequency of suspected malaria episodes and the number of times the respondents

sought self medication when got sick of malaria. The results are presented in Figure 4.1.

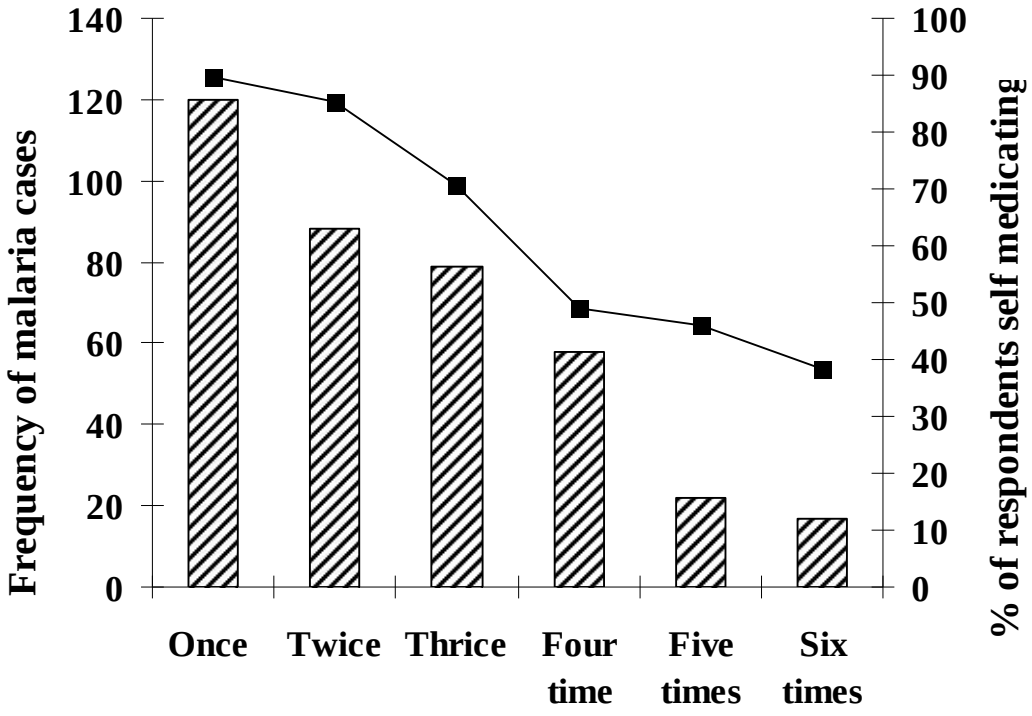


Figure 4.1: Number of suspected malaria episodes –vs- number of times the respondent sought self medication

About 120 respondents (31.3%) had suspected to have been sick with malaria only once in the past six months and almost 90% had used self-medication to treat the illness. A total of 88 (22.9%) of the respondents reported having suspected to have had malaria twice in the past six months of whom about 85% were found to be have self medicated over the two episodes. About 78 (20.3%) of the respondents had suspected to had malaria three times in the preceding six months and about 70% of them had opted for self medication. When the frequency of suspected malaria occurrence was four and five times, the percentage of respondents taking self-

medication reduced to 49% and 45% respectively and suspected malaria occurrence of more than five times resulted in only 38 % self-medication cases as compared to 62% who sought medical treatment from the hospital. Summarily, when the frequency of suspected malaria occurrence in the preceding six months was correlated with percentage frequency of respondents seeking self-medication, a clear significant negative correlation was established between the two variables ($r = -0.9243$, $P = 0.0000$) meaning the more the number of suspected malaria episodes, the less the individual I likely to self-medicate.

Among those self-medicating, the respondents were asked whether they knew the recommended dosage to be taken when they have malaria. The results are as shown in Table 4.4.

Table 4.4: Respondents knowledge of the recommended dose

	Frequency	Percent
Yes	113	35
No	206	65
Total	319	100

The results in Table 4.4 indicate that about one third of the respondents knew of the recommended dosage while the remaining two thirds did not know the recommended dosage. The difference in the number of those who knew about the dosage against those without any knowledge was statistically significant ($\chi^2 = 44.61$, df = 1, $p = 0.0021$).

The respondents who knew about the recommended were then asked how they knew

about the recommended dosage of the antimalarial drug they were self-medicating with. Their responses are tabulated in Figure 4.2.

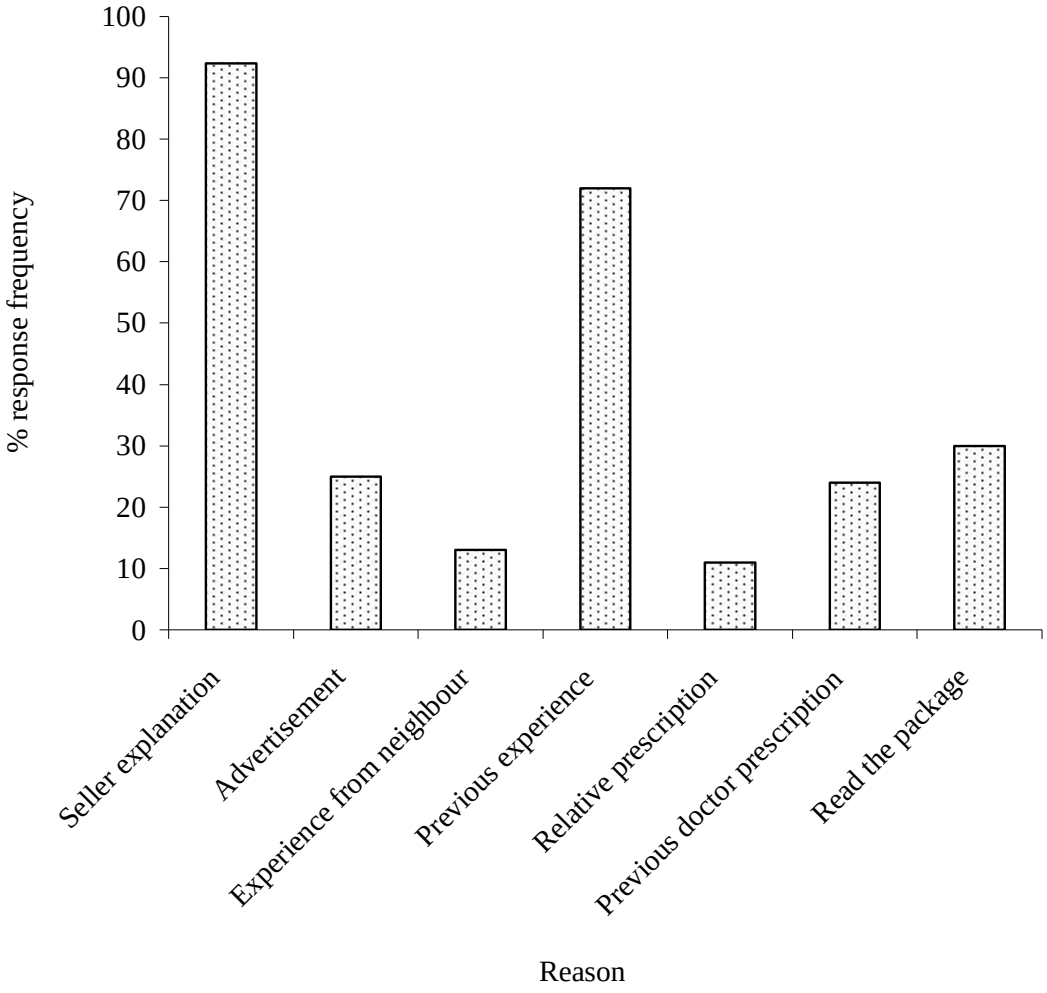


Figure 4.2: How the respondents knew the recommended dosage

Note that the total number of responses exceeds 100% due to double answers.

The proportion of respondents reporting different sources of information about the correct dosage were significantly different (χ^2 = 65.61, df = 1, p = 0.0001). Most of the respondents obtained information about the correct dosage through the medicine sellers' explanation (92%) or through previous experience (72%). A few respondents

either obtained information about the drug dosage from reading the package material (30%) advertisement (25%), prescription from a previous malaria episode (24%). experience from a neighbor (13%) or a relative's advice (11%).

Because of the diversity in responses about sources of information about recommended dosage among the respondents who had self-medicated and the relatively small percentage of patients who knew the drug's dosage through the right means, the researcher was interested in determining whether the respondents were aware that there was a possibility of developing adverse events due to the use of inappropriate dosages. The results are as shown in Table 4.5.

Table 4.5: Respondents awareness of the adverse effects of antimalarial drugs

	Frequency	Percent
Yes	60	18.8
No	259	81.2
Total	319	100

Among the 319 respondents who had self-medicated with antimalarial drugs in this study, about four fifths (81.2%) were not aware that inappropriate dosaging of antimalarial drugs could result in adverse effects to their health. Some actually believed that taking more than the recommended dosage "treated them faster" than taking "the recommended doses" of the antimalarial drug.

The researcher was also interested in determining whether the respondents were aware that the antimalarial drugs expire and that the expiry dates were indicated on

the drug packages and that there was need to confirm the expiry date before administering the medicine. Their overall responses are presented in Table 4.6.

Table 4.6: Respondents knowledge of drug expiry

Expiry of drugs		Frequency	Percent
Aware that drug expires	Yes	216	67.8
	No	103	32.2
		319	100.0
If aware that drug expires, knowledge that expiry date is on the drug package	Yes	24	11.2
	No	192	88.8
		216	100.0
Have read the package to determine expiry date	Yes	19	8.7
	No	197	91.3
		216	100.0

216 (67%) of the respondents who self medicated with antimalarial drugs in this study were aware that antimalarial drugs actually expire, while a third of were not. Whereas 67% of the respondents knew that the drugs do actually expire, only 24 (11.2%) of them reported knowing that there is an expiry date on the packet of the drug and only 19 (8.7%) reported having read the label of the drug packaging materials or the prescription insert to establish the expiry date of the drug.

4.4 Socio-economic and demographic factors associated with self-medication

The researcher sought to determine the socio-economic factors that affect self-medication patterns with antimalarial drugs in Gesima location. To realize this

objective, binary logistic regression was performed on eight socio-economic factors that had been previously reported in part 4.1. Factors that were found to significantly influence self-medication were then highlighted further by relating the frequency of self-medication against these factors.

First, a binary logistic regression model was performed on the eight socio-economic factors. The eight factors that were used in the regression model were age, gender, marital status, total number of household members, levels of education, employment status, distance from the health facility and average monthly incomes of the respondents. Three of the above factors which were investigated in this study were found to be associated with the practice of self medication in Gesima location. These factors were age of the respondents, total number of members in the family and income levels of the respondents. The significance indicated against each of these factors was always less than 0.05, which were acceptable levels to declare the results significant.

Table 4.7: Binary logistic model depicting the significant socio-economic and demographic factors influencing self-medication in Gesima Location

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	GENDER	.708	.572	1.531	1	.216	2.031
	AGE	-.055	.021	7.210	1	.007	.946
	MARITAL	-.066	.857	.006	1	.939	.937
	TOT_MEMB	.566	.209	7.356	1	.007	1.761
	EDUCATIO	-.130	.423	.095	1	.758	.878
	DISTANCE	.246	.350	.494	1	.482	1.279
	EMPLOYME	.349	1.332	.069	1	.793	1.417
	INCOME	-.914	.396	5.340	1	.021	.401
	Constant	3.024	4.992	.367	1	.545	20.581

a. Variable(s) entered on step 1: GENDER, AGE, MARITAL, TOT_MEMB, EDUCATIO, DISTANCE, EMPLOYME, INCOME.

Further attempts to determine how each of these three significant factors related with self-medication with antimalarial drugs of the respondents were then made.

The first aspect considered was how the age of the respondents affected self-medication in Gesima Location. Results showing self medication profile against those attending hospital on age is shown in Figure 4.3.

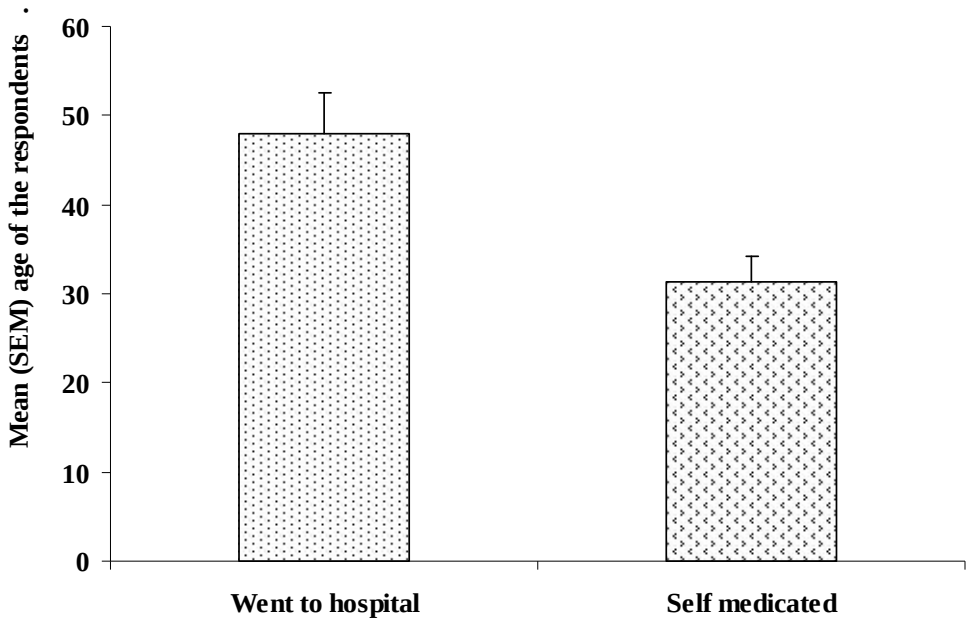


Figure 4.3: Mean age of respondents attending hospital versus self medicating when suspecting to be suffering from malaria.

The results indicate that overall those with higher mean age (48.3 ± 4.9 years) were seeking treatment from the hospital while those of lower mean age (31.3 ± 3.2 years) practiced self medication. The results after performing a t-test indicated highly significant differences between those seeking treatments from the hospital and those self medicating ($t = 23.322$, $df = 1$, $P = 0.0001$) in terms of age profile.

Secondly, the total number of members in each household where the respondents came from was determined. This information is shown in Figure 4.4. The data was established to be normally distributed and therefore the responses of the respondents followed normality.

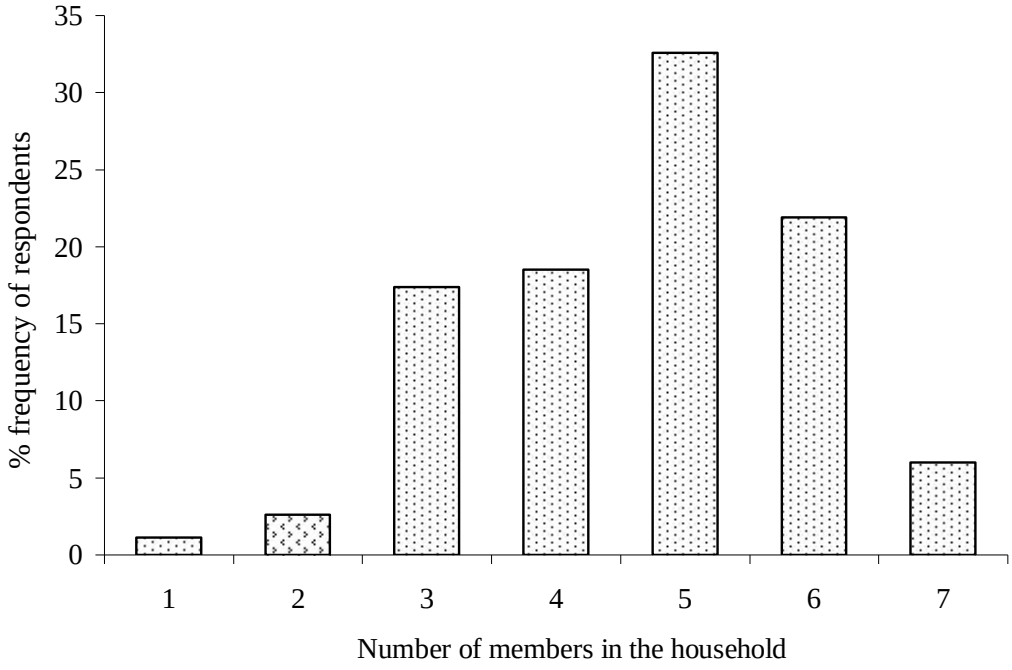


Figure 4.4: Frequency of self-medication with antimalarial drugs-vs-number of members of respondent's household

In the data set, there was a polynomial increase in the number of respondents seeking self-medication as the number of members in the household increased from 1 to 5 members; thereafter as household members increased in number from 5 to 7, those who used self-medication reduced. The number of members in the household was found to significantly influence the number of respondents self medicating (χ^2 = 105.61, df = 6, p = 0.0001).

Finally response on the use of self-medication as a function of household income was also sought from the respondents from Gesima Location. The data was established to be normally distributed and therefore the responses were considered within the range of data normality. Information on the relationship between income level and self-medication with antimalarial drugs in Gesima Location is shown in Figure 4.5.

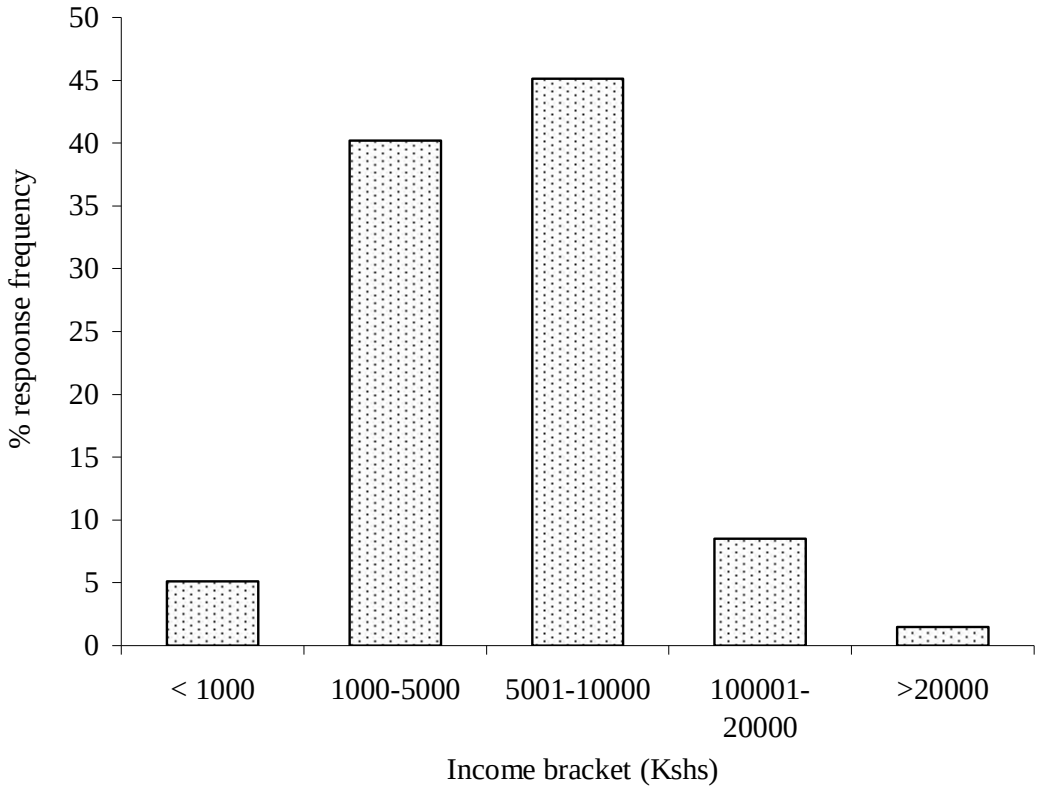


Figure 4.5: Percentage of respondents with different income using self-medication when suspecting to be suffering from malaria.

The results showed an increase in the number of respondents seeking self-medication as the income increased from less than Kshs. 1,000 to Kshs. 10,000. However, beyond income levels of Kshs. 10,000, there was a significant decline in the number people self-medicating among the respondents as they now preferred to seek treatment from

the hospitals. Income level was found to significantly influence the number of respondents self medicating ($\chi^2 = 45.61$, df = 4, $p = 0.0001$).

4.5 Reasons for self-medication with antimalarial drugs

The second objective of the study sought to establish the reasons for the practice of self-medication in Gesima Location. This was done by first determining the reasons why respondents preferred self-medication, and then further information concerning advantages of self-medication over conventional treatment in the hospital was sought. Thereafter some of the drugs that are commonly self-medicated were determined and deeper information about how they made their choices of what drug to self-medicate with was sought as well as the respondent's levels of satisfaction from the service got from these sources.

The first aspect sought from the respondents was the main reasons why they prefer to practice self -edication rather than visiting the hospital when they suspected to have fallen ill with malaria. The results are as shown in Figure 4.6.

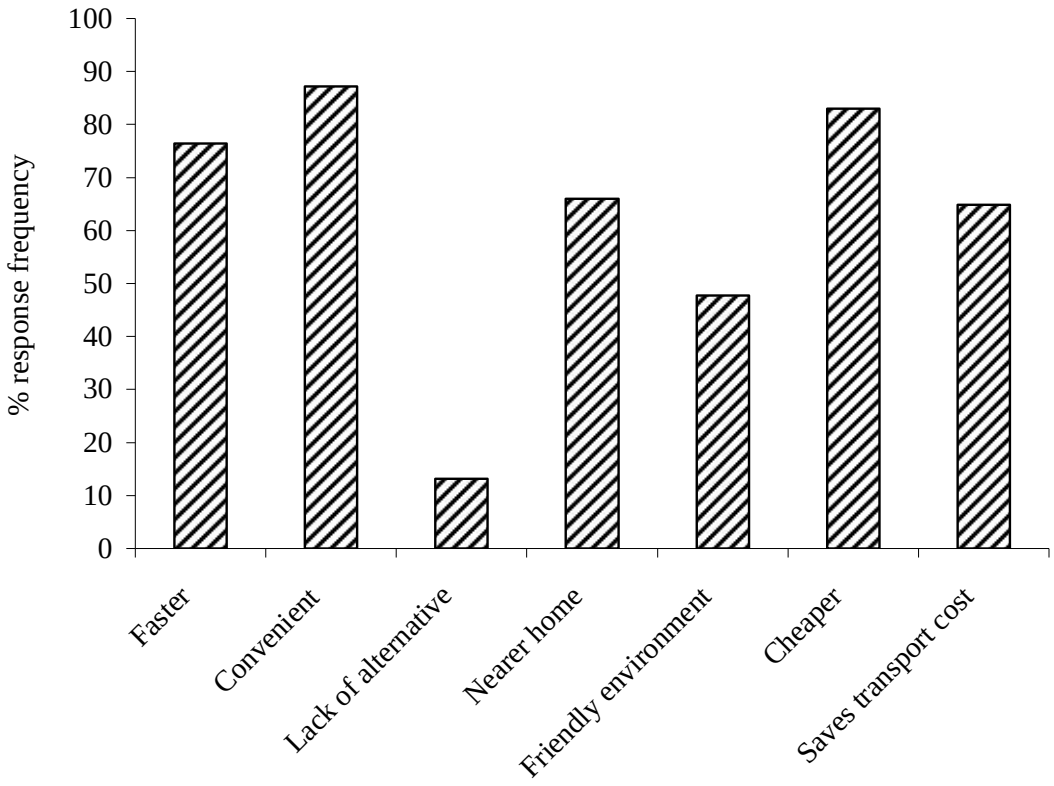


Figure 4.6: Reasons why respondents preferred self-medication over visit to the hospital

The reasons reported for preferring self-medication instead of visiting a health care practitioner included the saving of time, convenience, long distance to the health facility, and cheaper cost both in terms of price of services at the healthcare practitioner and by saving on the transport costs to the health facility. About 50% stated that they preferred to buy medicine from the local drug shop because it had a friendlier environment than the local health facilities and 10% stated that they lacked an alternative to self-medication.

Secondly, the investigator sought to determine the types and prices of drugs that are commonly self-medicated by the respondents. Their prices were based on the regional drug index (Kimotho *et al*. 2007). The result is as shown in Table 4.8.

Table 4.8: Types of self-medicated antimalarial drugs bought by the respondents and their respective unit prices

	Class	Frequency	Percentage (%)	Unit price (Kshs)
Chloroquine Tablets	Aminoquinoline	3	0.9	20
Malaratab Tablets	Amodiaquine	24	7.5	60
Orodar Tablets	Sulfadoxine-Pyrimethamine	97	30.4	20
Fansidar Tablets	Sulfadoxine-Pyrimethamine	40	12.5	90
Metakelfin Tablets	Sulfamethoxypyrazine-Pyrimethamine	24	7.5	100
Amobin Tablets	Amodiaquine	6	1.8	270
Meriquine Tablets	Amodiaquine	4	1.2	35
Malodar Tablets	Sulfadoxine-Pyrimethamine	6	1.8	30
Homaquine Tablets	Amodiaquine	7	2.1	40
Falcidin Tablets	Sulfadoxine-Pyrimethamine	82	25.7	30
Amobin Syrup	Amodiaquine	11	3.4	85
Cotecxin Tablets	Dihydroartemisinin	6	1.8	410
Coartem(AL) Tablets	Artemether-Lumefantrine	9	2.8	635
Total		319	100	

As can be seen from the table above, an overwhelming majority of the respondents, 78% still relied upon SP's preparations whenever they thought they were had a malaria epsiode, 16% used amodiaquine, 0.9% used chloroquine, 1.8% used dihydroartemisinin, an artemisinin monotherapy and only 2.8% were using the current 1st line government of Kenya recommendation for uncomplicated malaria, Artemether-lumefantrine.

4.6 Sources of Self-Medicated antimalarial drugs

The third objective in this study was to determine the sources of self-medicated drugs that are used in Gesima Location as shown in Table 4.9.

Table 4.9: Sources of drugs used for self-medication

	Frequency	Percent
Drug shop	140	43.9
General shop	142	44.5
Mobile drug vendor	22	6.8
Left over from previous prescription	8	2.5
Relative/Friend	7	2.2
Total	319	100

An equal proportion of respondents, 44%, obtained the drugs they used for self-medication from drug shops and general shops while 7% purchased their antimalarials from mobile drug vendors, and about 2% each got the antimalarial drugs used for self-medication from left-overs from past prescriptions and friends or relatives.

The investigator further sought to establish how the respondents got information about the drug they chose to self-medicate with and the result is presented in Figure 4.7.

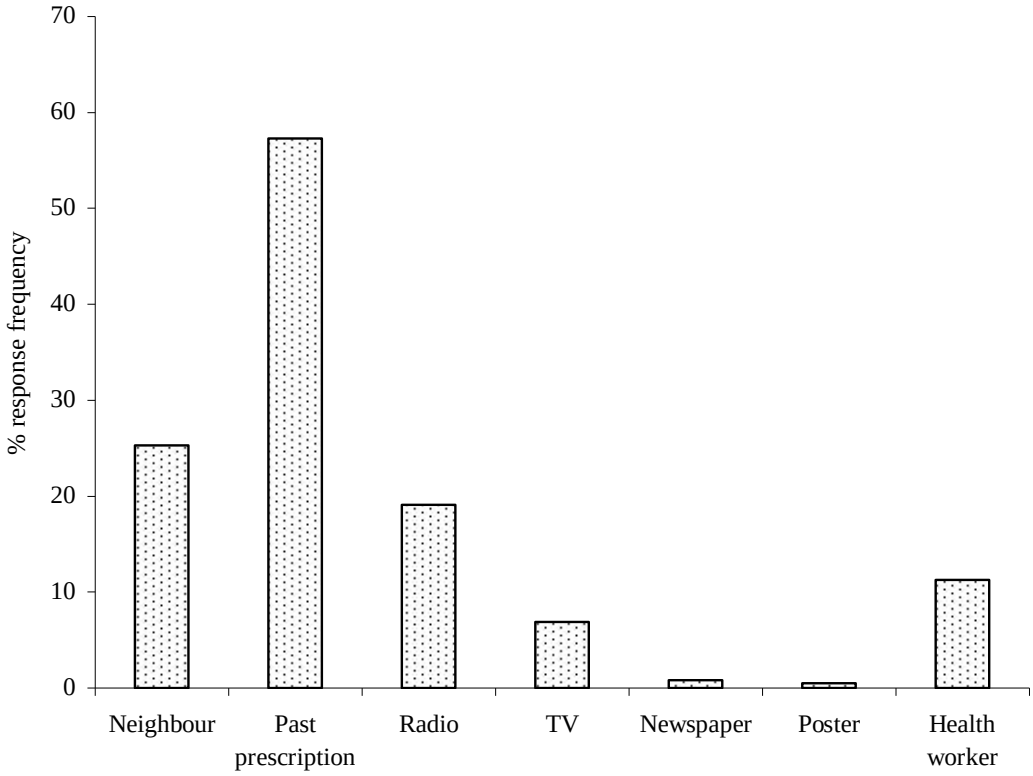


Figure 4.7: Sources of information about antimalarial drugs used for self-medication

Sources of information about the drug sellers among the respondents were previous prescriptions (57%), neighbors (25%), radios (19%), health workers (13%), television (6%), newspaper (0.5%) and poster advertisements (0.5%).

The main complaints by respondents about the drug vendors were also sought by the study and the results presented in Table 4.10.

Table 4.10: Main complaints about drug vendors from their customers

Complaint	Frequency	% Frequency
Poor customer service	4	1.2
High drug costs	32	10.0
Regular stock out of drugs	8	2.5
Unethical behaviour	8	2.5
Unqualified drug sellers	19	5.9
Unhygienic Conditions	68	21.3
Ineffective drugs	38	11.9
No Complaint	142	44.5
Total	319	100

There were few notable complaints raised by the respondents against the drug providers in Gesima Location. Key among them was unhygienic conditions, high cost of the drugs and ineffective drugs. 44.5 % of the respondents had no complaint about the services they received from the drug vendor.

4.7 Legal status of the drug outlets in Gesima Location

The final objective of the study was to determine the status of drug outlets in Gesima Location. Information concerning the types of shops used to sell drugs, licensing status and qualification of the operators is summarized in Table 4.11.

Table 4.11: Legal status of drug outlets in Gesima Location

Particular	Description	Drug Shop		General Shop	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Qualification of the In-charge	Diploma in Pharmaceutical Technology	1	20	0	0
	Certificate in Pharmaceutical Technology	1	20	0	0
	Nurse Aide	3	60	0	0
	None	0	0	20	100
Retail Chemist License	Present	0	0	0	0
	Absent	5	100	20	100
Other type of license	Medical Clinic	0	0	0	0
	General Trading Shop	2	40	12	60
	None	3	60	8	40

All the 5 drug shops in Gesima Location and 20 sampled general shops were considered in this study. Out of the 5 drug shops, one was run by a pharmaceutical technology diploma holder, one by a certificate in pharmaceutical technology holder and three by nursing aides. All these people in charge of the drug shops did not possess annual practice licences from the Pharmacy and Poisons Board allowing them to handle antimalarial drugs and other medicines. Two of these five drug shops had a genela trading licence from the county council of Nyamira but none of the five had a premises registration licence or a retail/wholesale chemist licence as required by the Pharmacy and Poisons Board. Of the 20 general retail shops which interviewed, 12 were found to have the general trading licences from the Nyamira county council whereas 8 did not have any form of licence. None of them had premises registration licence or a retail/wholesale p chemist licence from the Pharmacy and Poisons Board.

The researcher also sought to find out more information about the services offered by the drug/shop attendants to the customers. Firstly, the drug/retail shop owners or attendants were asked whether they provide drugs without any prescription if the patients asked for them. The results indicated that all the drug outlets sell antimalarial drugs to the patients without prescription. Further, about three quarters of the drug outlet attendants did not inquire about the patients' illness before dispensing an anti-malarial drug to the customer. Over four fifths of the drug outlets attendants did not have adequate information about the need for full compliance to antimalarial drug dosages while at least 90% of the drug or general shops did not explain the dangers of not fully complying with the antimalarial drug dosage.

Information concerning the main types of antimalarial drugs stocked in the shop and frequently bought from the shop outlets for self medication was sought from the drug outlet operators (Figure 4.8). Antimalarial drugs that were stocked in most shops were Falcidin and Orodar and these were also the most purchased by patients in most of the shops. Both these drugs belong to the Sulphadoxine-Pyrimethamine group of antimalarial drugs.

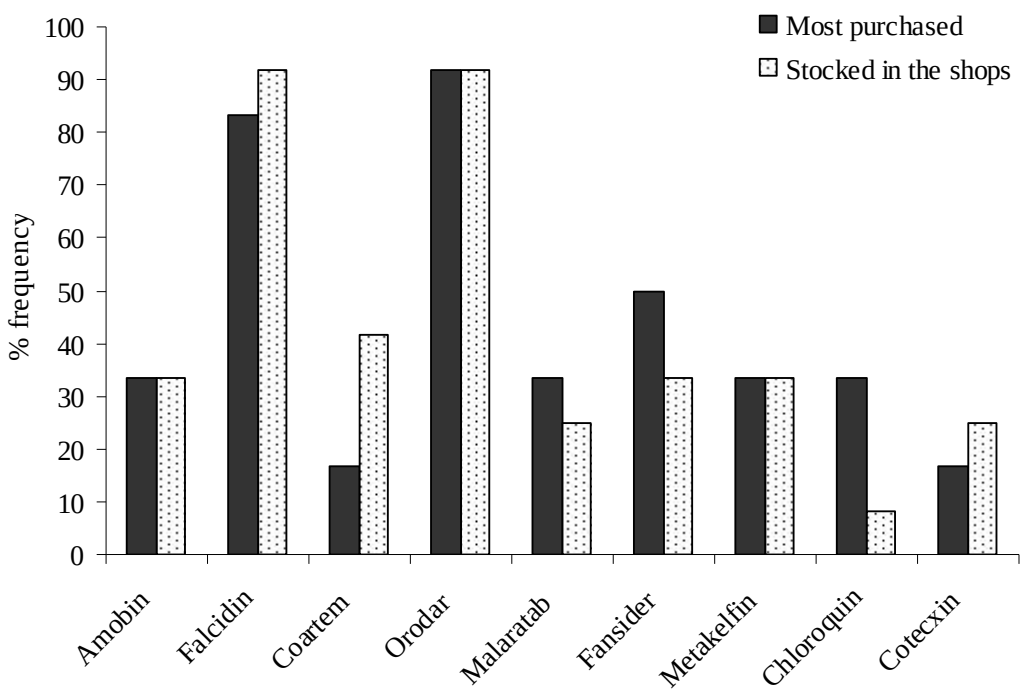


Figure 4.8: Main types of antimalarial drugs stocked in the shop and frequently purchased from the drug outlets for self medication.

CHAPTER FIVE

5.0 DISCUSSION

Before discussion of the main findings, it is important to highlight the limitations experienced with this study. Recall bias was one of the important potential limitations of the study. Problems in remembering the details of the particular medicines which were taken for a particular illness could affect the generalization of the results to bigger populations. However drug charts and review of remnant drug packages or tablets were used to minimize this effect. Quantitative estimation of recall bias would have helped in more precise delineation of the effect of this limit on the study findings. However, this was not done in this present study. Unwillingness of some participants and in particular, the drug and general shop attendants, to co-operate and give information to the researcher and his assistants was also a challenging limitation. Some drug outlet operators mistook the research team for drug inspectors from the Ministry of Health who were going to inspect their premises. Indeed some shops closed down on several occasions whenever they heard that the researcher and his team were in the vicinity. To overcome this, the researcher was forced to seek the help of the local public health officer and the market leaders in explaining to the shop owners the purpose of this study. It is recommended that before the conduct of studies in future, the local community should be fully engaged and involved of the studies objective and not just the respondents and the administration. This is likely to reduce the level of mistrust that some respondents may have over the study. In order to evaluate a wide range of factors that maybe independently associated with self-medication and not just the socio-demographic factors, future studies should employ the use of focus group discussions to first find out the main reasons or issues surrounding self-medication as well as the common barriers to going seeking health

services from a healthcare professional. R-square values should also be used in the analysis of the data in order to quantify how much variation in the self-medication patterns is due to the identified factors and also to show the variation due to other unmentioned factors.

Despite these limitations, the study was able to come up with some tentative findings and conclusions and they are discussed below.

5.1 Discussion

5.1.1 Magnitude of self-medication with antimalarial drugs

Treatment seeking behavior for malaria in sub-Saharan Africa is complex, often involving several steps and actors depending on the local health system, society and culture (McCombie, 1996, Obrist *et al*., 2007). As a result of many diverse reasons such as perceived poor performance of formal health services, geographic and econonomic inaccessibility (McCombie, 2002; Gyapong *et al*., 2007), presumptive treatment of malaria episodes at home has become widespread and fever usually prompts this malaria treatment action (McCombie, 2002). Few studies have investigated the extent of self-medication with antimalarial drugs (Kiyingi *et al.*, 1993, Durgawale, 1998) although it has been shown to vary across geographic areas with rates ranging from 4 to 87% (McCombie, 1996). Some of the few studies that have been done found overall self treatment rates of more than 90% for fever (Deming *et al*., 1992; Mwenesi *et al*., 1995; Ndyomugyeni *et al*., 1998; Molyneux *et al*., 1999). In Togo, only 20% of children less than five years of age with fever were seen at a health centre and 83% were treated at home with an antimalarial drug obtained from a street or market vendor (Deming *et al*., 1989) and in a survey in Uganda, fever was the symptom that had the highest self treatment rate (74% versus 54% for diarrhea)

(Adome *et al*., 1996). In previous studies, a prospective study in Kenya found a rate of 78% (Ruebush *et al*., 1995) while on the Kenyan coast, shop-bought medicines were used first or solely in 69% of childhood fevers treated (Molyneux *et al*., 1999). This study established an antimalarial drugs self-medication magnitude of 83.1% in Gesima Location, a finding in conformity with previous studies elsewhere where majority of the respondents preferred to use self-medication when affected by malaria (WHO, 1983; World Bank, 1993). In Zimbabwe, self-medication was reported to be common in up to 95% of households in Harare with the most commonly self-medicated drugs being antimalarials due to the convenience of getting the drugs (Kasilo *et al*., 1991). A study done in Dar-es-Salaam, Tanzania to assess the extent of self-medication with antimalarials reported that 71.7% of the interviewed individuals treated themselves for suspected malaria fever due to varied reasons (Mnyika *et al*., 1995). In Khartoum state Sudan, a study done by Awad *et al* (2005) found the prevalence of self-medication with antimalarial drugs to be 43.4%, while Worku *et al* (2000) found it to be 30.3% in Jimma town, Sudan. The findings of this study also concur with several previous studies in other parts of Kenya. As stated above, Ruebush found a self-treatment magnitude of 78% in the rural lowlands of western Kenya whereas in the coastal region of Kenya, the magnitudes were as high as 69% (Ruebush *et al*., 1995, Molyneux *et al*., 1999). An ethnographic study on lay people's classification of drugs in the lower areas of Kisii district found that that 83% of the people who thought they were suffering from malaria began with self-treatment with pills (Nyamongo, 1999) a rate similar to the one found in Gesima Location.

Antimalarial treatment seeking behaviour varies across communities and individuals depending on several factors. In Gesima Location, some of respondents who had

suffered from malaria chose to go to the hospital, a few went to traditional healers and mobile drug vendors while the vast majority chose to go direct to the drug or general retail shop to buy the antimalarial drugs. A smaller group of the respondents actually chose to pray and do nothing, yet their symptoms resolved. This is a clear indication of the fact that they were not suffering from malaria in the first place, they only had symptoms similar to the ones of malaria in concurrence with Owino *et al.*, (2005) who found that many common ailments and even exhaustion can manifest with 'fever' and the local residents are likely to confuse these symptoms for malaria illnesses. Expressly, the issue of drug misuse is manifest here which results in exerting unnecessary drug pressure ultimately leading to rise of antimalarial drug resistance (D'Alessandro and Butiens, 2001; Yeung *et al.*, 2004).

The widespread pattern of stopping medication when symptoms resolve is well known (McCombie, 2002). Among the self medicating respondents in this study, a large majority, 65%, did not know the recommended dosage. Previous studies show a relatively poor knowledge of correct dosages among self medicating patients living in rural areas differing from as low as 3% in Burkina Faso (Pagnoni *et al.*, 1997) to about 39% in Zambia. Clearly knowledge of correct doses is an important variable, and correct dosages are unlikely to be given if they are not known. Interestingly, even in studies where a relatively high correct dosage knowledge rate has been reported such as 58% in Kisii district, Kenya (Nyamongo, 1999), a 'gap' between knowledge and behaviour has been illustrated by other studies among school children which found that dosages of antimalarials were typically inadequate, even though the correct dosage was known (Brooker *et al*., 2000). A literature review by McCombie (1996), found that "although use of antimalarials is widespread, underdosing is extremely

common" (p.933). This has potentially harmful side-effects including an increase in parasite resistance to antimalarial drugs (Nyamongo, 1999). Some respondents reported having taken a dosage as per previous experiences where more or less of the recommended dosage 'cured' them. In many communities, only a medically trained professional can properly advise the patient on the medicament's recommended dosages. However, in areas where the medical practitioners lack, there is usually a tendency by the people to rely on the drug vendors to know the recommended dosage (McCombie, 2002). In Gesima, the local community members relied intensely on drug vendors who were mostly unqualified as shown in this study and are therefore not likely to recommend the correct dosages (see discussion under legal status of drug vendors). In such circumstances therefore, safety of self-medication with antimalarial drugs is not guaranteed and with this comes a rise in the risks associated with the practice.

This study found that only 18% of the respondents who self-medicated with the antimalarial drugs were aware of the fact that medicaments do actually have toxic profiles which can be adversely manifested in some circumstances. This is worrying especially in cases where the individual might think that the more quantity of a drug you take the quicker you are likely to recover. It is also worrying that although 67.8% of the respondents who self-medicated reported having knowing that drugs do expire, 89% of them did not know that the antimalarial drug package had the dosage indicated on it and 91.3% had not bothered to read and ascertain the expiry date of the drug. It is most likely therefore that the affirmative answer to whether they knew that drugs expire or not was a bias response prompted by the question. Studies quantifying the negative effects of self medication with antimalarial drugs are lacking. However,

it is a matter of great public health concern when such high proportions of the populations do not know about the importance of expiries of antimalarial drugs especially since it has been shown that as many as 56% households in Nigeria (Isah *et al*., 1995), 80% in Congo (Carme *et al*., 1992), 68% of men and 77% of women in Dar-es-Salaam, Tanzania (Mnyika *et al*., 1995) and other malaria endemic regions store antimalarial drugs at home for future malaria episodes. It is therefore possible to expect that prompt treatment is more likely to occur when antimalarials are available at home and these people are highly likely to self-medicate even with expired antimalarial drugs opening the possibility of a myriad of adverse events.

Many studies of treatment-seeking do not report on what therapies were actually used for an episode of illness (McCombie, 2002). Some studies reported that 'most' treatments obtained from the shops were antimalarials while in a few studies, percentages of antimalarial use are reported (McCombie, 2002). This study however determined which therapies were actually used for self-medication, given the dynamic shifts in treatment policies regarding antimalarial drugs due to rapid emergence of resistance to previously commonly used antimalarial therapies. This study found out only 2.8% of the self-medicated antimalarial drugs were Artemisinin based Combination Therapies (Artemether-Lumefantrine), the current 1st line treatment for malaria in Kenya and the rest were drugs no longer recommended for the treatment of malaria due to high resistance rates, including Chloroquine which was self-medicated by 1% of the respondents and SPs (78%). Chloroquine was replaced by SP as the 1st line antimalarial therapy in Kenya in 1998 after having achieved level III resistance while the SPs themselves were replaced by Artemisinin based Combination Therapies (ACT's) in 2004 after having suffered the same fate as chloroquine (Esamai *et al*.,

2004). It is thus a serious public health concern that such a high number of people within the population continue to use these highly ineffective antimalarial drugs which not only prolongs suffering and leads to more severe disease status, but also leads to wastage of household resources of these vulnerable populations who bear the greatest burden of malaria.

5.1.2. Socio-economic and demographic factors associated with self-medication in Gesima Location

Socio-economic and demographic factors are often related to self-treatment but they tend to vary more across geographic sites (McCombie, 2002). In Bombay, India, people from high socioeconomic areas were more likely to engage in self-diagnosis and self-medication (Kamat & Nichter, 1998), while in Kerala state India, obtaining medicines without a prescription was associated with low education and perception of the expense of visiting a doctor (Saradama *et al*., 2000). In Nigera, self-treatment was more common among males and single people (Brigler *et al*., 1986), whereas in a previous study on medicine use by 11-17 year olds in Kenya, boys were more likely to self-treat than girls (Geissler *et al.*, 2000). In this study, the practice and pattern of self-medication using antimalarial drugs in Gesima location was found to be mainly influenced by the age of the respondents, total number of members in the household and income levels.

Previous studies of health facility use have presented indirect evidence that the age of the patient may be related to self-treatment (McCombie, 2002). Three studies in Africa have found that younger children are more likely to be taken to the health facilities (Kaseje *et al*., 1987; Sluktser *et al*., 1994, Molyneux *et al.*, 1999) while a

study in Mynamar found that delays in being taken to a hospital were more common for those older than 15 years (Ejov *et al*., 1999) and in Khartoum state Sudan, self-medication with antimalarial drugs was found to be more common among the younger age group (<40 years) (Awad *et al.*, 2005). Similarly, this study found that in Gesima location, the magnitude of self-medication with antimalarial drugs was found to be higher in the younger population (mean age 31) whereas the older residents (mean age 48 years) were found to self-medicate less often, a finding which is in agreement with the previous studies where it was found that self-medication with antimalarial drugs was less common in the elderly, a health seeking behaviour attributed to the weakened immune systems of the senior citizens which makes them more vulnerable to disease attacks and therefore a tendency to be more responsive to seeking healthcare services from healthcare practitioners (McCombie, 2002).

The total numbers of household members was also found to be a significant determinant of self-medication patterns. There was an increase in the number of respondents seeking self-medication as the number of members in the household increased from 1 to 5 members. However, beyond 5, the magnitude of self-medication began to fall. Increase in number of household members portends an increased cost of living and higher dependency ratio (Saradama *et al.*, 2000). Therefore when the household size increases, the household spends more money on basic upkeep by buying food and other basic commodities leaving very little for buying medicine. This can explain why as the number of household members increased beyond 5, there was a decline in the tendency to seek self medication as there was increased competition of needs. Closely related to this, the researcher also established that most of the households with more than 5 children fell in lowest income level category. Indeed, a

binary logistic regression analysis of the very poor depicted a tendency to seek healthcare services at a recognized health facility, possibly due to the lack of money to purchase antimalarial drugs directly from the drug vendor (see discussion on income level below).

Income level was also a factor that was found to significantly affect self-medication patterns with antimalarial drugs in Gesima location. As income level per month increased from less than Kshs. 1,000 to Kshs. 10,000, there was a parallel increase in the practice of self-medication. However, beyond income levels of Kshs. 10,000, there was a significant decline in the number people self-medicating among the respondents as they now preferred to seek treatment from the hospitals. This indicates that most people prefer to self-medicate if they had moderate income levels. When income levels increased beyond Kshs. 10,000 per month then most people sought medical attention from the hospitals. This is in conformity with findings from Kerala State, India (Saradama *et al*., 2000), Khartoum state, Sudan (Awad *et al*., 2005), and in Jimma town, Sudan (Worku *et al.*, 2003). Whereas educational levels has been consistently found to be associated with health behaviours, self-treatment for malaria inclusive (McCombie, 2002), this study did not establish an explicit association between self-medication with antimalarial drugs in Gesima Location. In Tanzania, post-secondary school educational level was associated with promptness in seeking care from a health care provider (Tarimo *et al.*, 2001) and in Malawi, higher education of the household head was associated with attending a clinic (Slutsker *et al*., 1994). In a study comparing two communities in Accra Ghana the poorer community with lower educational levels was more likely to engage in self-treatment (Biritwum and Welback, 2000). A study in Eastern Kenya involved a comparison of

rural and urban areas and showed that although the mothers differed greatly in a number of demographic variables including education level, the response to uncomplicated fevers was similar with both initially opting for the drug shop as the first treatment step (Molyneux *et al.*, 1999). Previous studies in Nigeria also did not show substantial differences between the more educated urban and the lesser educated rural populations (Odebiyi, 1992), with a later one in Ghana showing that self-treatment was more common in urban areas than in rural areas (Agyepong and Manderson, 1994). In this study, the proportions of respondents with post-secondary school education or no education at all was quite small (4.2% each) and this could explain the inconsistency of this study with other studies in as far as elucidation of an elaborate association between education levels and self-medication is concerned. Narrower education levels should probably be considered in future studies in order to allow for more specific evaluation for differences in self-medication per education level.

5.1.3 Reasons for self-medication with antimalarial drugs

Self-medication is a common part of healthcare. The reasons cited as accounting most for the self medication patterns with antimalarial drugs in Gesima location include convenience of buying the medicine from the local drug shop, saving of the cost of transport to the hospital if one buys the medicine at the local shop, that it was cheaper to buy medicine from the local drug shop than to seek treatment at the hospitals, that it was faster to buy drugs from the local shop than to go to the health facility and that the shop owners were friendlier than the staff at the health facilities. In general, three common reasons that have emerged from previous studies as related to self-treatment are time, cost and perception to severity (Gomes *et al.*, 1998). A study done in Kenya by

Ruebush and collegues (Ruebush *et al.*, 1995) on self-treatment and treatment seeking behaviour found that 60% of febrile illness episodes were treated at home with herbal remedies or medicines purchased at local shops out of whom about 50% of respondents reported that that self-medication was cheaper and convenient as compared to seeking health services from the health facility.

Medicine sellers can be found in drug shops, general stores, kiosks and market stalls and also operate as itinerant hawkers in several settings. Studies have documented that being business people, medicine sellers maintain their existence in response to consumer demand and in this case for accessible, convenient, reliable and affordable antimalarial remedies (Goodman *et al*., 2007). They are generally located closer to homes than formal health facilities (Snow *et al*., 1992). Their service is normally faster and their weekly opening hours maybe twice as long as those in health facilities (Goodman, 2004) and are perceived as being friendlier and more approachable (Williams *et al.*, 2004). As mentioned by more than 80% of respondents in this study, cost is an important motivation. In most cases, the patients who seek to purchase drugs directly from the drug shop do not pay for consultation or diagnostic tests, they evade paying some of the illegal charges charged at some facilities and they can actually purchase a smaller number of pills than the required full dosage quantity at a lower price (Adome *et al.*, 1996). All these factors correlate with the findings in Gesima location as far as the issue of cost goes.

A strong indicator of the cost motivation is the type of drug purchased by the respondents. The study revealed that more than 62% of the respondents who self-medicated relied on SP, amodiaquine and chloroquine preparation costing less than

K.Shs 40.00 per dose. This is despite the presence of more expensive SP preparation such as Fansidar and Metaklefin and also the expensive but effective artemisinin derivatives including dihydroartemisinin and AL, the government's 1st line recommended ACT. At the time of carrying out this study, the government had already started distributing free malaria drugs (AL) in all public facilities but still a vast majority of respondents preferred to buy antimalarial drugs for self-medication from the drug outlet, a finding which has been noted in other studies where medicine sellers are used even when supposedly more convenient and cheaper alternatives exist (Ezedinachi *et al*., 1991, Bhattacharya *et al*., 1997).

When faced with multiple occurrences of malaria over time, many people have unique ways of responding to the different episodes (Temu *et al.*, 2005). Association between visiting health care facilities and duration of illness have been reported frequently and often authors note a tendency to seek health care services from professionals when home remedies have failed (McCombie, 2002). This was found to hold true in Gesima location, where the number of times one had been affected by malaria affected their response to malarial self medication. In cases where there were lower cases of malaria frequency and severity, most of the people preferred self medication and only went to seek treatment in healthcare facilities with a repeat of malaria episodes. This is in agreement with previous studies done elsewhere in other parts of Kenya where most of the patients reported that they had used antimalarial drugs before visiting the hospitals (Nyamongo, 1999). Another study by Ruebush *et al* (1995) also found out that people tended to self medicate when they thought their conditions were mild but sought professional health care services when their conditioned became more severe. Again, this practice demonstrates the likelihood of wastage of resources on medicines with

no efficacy value and the possibility of disease progression into more severe stages that require more complicated management and therefore increased costs of care and prolonged suffering.

5.1.4 Sources of self-medicated antimalarial drugs

This study also set to find out more information about the sources of self-medicated drugs that are used in Gesima Location. The first aspect of the information sought was concerning the sources of drug for self medication. Almost an equal number of respondents, (about 44%) who self-medicated got their drugs from both the drug shops and general shops while 6.8 % of the respondents bought their antimalarial drugs from mobile drug vendors, and an equal proportion, 2%, got their antimalarial drug supplies from either previous left over prescriptions or from relatives and friends. In Jimma town, Sudan, 19% of the self-medicated drugs were obtained from the open air market 7% from kiosk, 52.4 % from large retail outlets, leaving only about 20% to be sourced from licenced shops (Worku *et al.*, 2003). This trend replicated in most developing countries where illegal purveyors of drugs are common (Worku *et al.*, 2003). Foster found that unofficial drug sellers in markets, streets and village shops account for as much as half of antimalarials distributed in many developing countries (Foster, 1991). This use of drugs from informal sectors such as open markets and village kiosks has been shown to encourage the practice of self-medication (Worku *et al.*, 2003).

5.1.5 Legal Status of drug outlets in Gesima Location

In Kenya, regulation of the practice of stocking and dispensing all forms of human medicines is provided for under the Pharmacy and Poisons Act (Chapter 244 of the

Laws of Kenya). The scope of this Act as far as this study is concerned entails issues like availability, labeling, dispensing and marketing of drugs, the qualifications of staff, the location and nature of the premises and in some circumstances, the prices charged. As expected, we have several kinds of entities dealing with human medicines some of which do so entirely within the law, others are legal entities but perform illegal activities whereas others are completely illegal. The above Act states that not all cadres of health workers can prescribe or dispense Part I poisons (Prescription Only Medicines (POM). Only Medical doctors, dentists and clinical officers are allowed to prescribe and only graduate pharmacists can dispense all prescription drugs. Pharmaceutical technologists can only dispense Part II poisons (Pharmacy only drugs) and can only dispense part I poisons under the supervision of a graduate pharmacist (GoK, 1988). Each drug outlet is supposed to be duly licensed by the Pharmacy and Poisons Board upon achieving the minimum requirements in accordance with the above regulatory requirements. They are then issued with an annual business premises registration licence and/or a wholesaler's trade licence for those wishing to wholesale alongside a pharmacist's or pharmaceutical technologist's annual practice licence for the personnel in charge of the business. In Gesima Location, none of the 5 drug shops and 20 general shops interviewed had any of the above documents from the Pharmacy and Poisons Board and were therefore stocking and selling antimalarial drugs completely illegally.

Further in the five drug shops, neither the pharmaceutical technologists nor the nursing aides in charge of the shops had annual practice licenses from the Pharmacy and Poisons Board, which is in contravention of the regulations and none of the shop attendants in the general shops had any basic training in any healthcare related field.

Previous studies elsewhere show the findings in Gesima location to hold true. Education levels vary across medicine sellers, but most have little or no formal training in medicine of pharmacy (Goodman *et al*., 2007) and drug shop staff may be untrained or trained as medical assistants or nurses, perhaps with some experience in the formal health sector (Adome *et al.*, 1996, Goodman C.A., 2004). Even if the official licence holder has a health-related qualifications, outlets are often staffed by less qualified assistants (Brieger *et al*., 2004). Inadequate medicine seller knowledge is likely to be exacerbated by the recent introduction of Artemisinin-based Combination Therapies in Kenya because these drugs have new and sometimes complicated dosage regimens and more than one brand/trade name of the same generic product maybe available with different dosages (Goodman *et al*., 2007) an example being in Nigeria where 95% of medicine sellers incorrectly considered artesunate monotherapy as an ACT. With inadequate medicine seller knowledge, the antimalarial drug sellers cannot be effective and safe providers of antimalarial drugs to the communities they serve.

One hundred percent (100%) of all drug/general shop attendants interviewed reported that they regularly dispensed antimalarial drugs without prescription while over 80% acknowledged that they did not enquire about the patients condition before dispensing the antimalarial drug and over 90% did not explain nor understand importance of explaining to the customer the need to comply with the recommended drug dosage. Despite the public health importance of medicine sellers, concerns surround the appropriateness of drugs and information that the sellers provide (Goodman *et al*., 2007). Most of the illegal medicine sellers have been found to often store and handle drugs inappropriately keeping them in conditions of excessive heat, light and moisture

that may endanger their potency and storing them in re-used, wrongly labeled containers (Geissler *et al*., 2000) and Gesima Location was not an exception. 100% of the shops sampled stocking and selling antimalarial drugs did not have a drug shop plan as required and none of them had systems of regulating the temperatures of the places the drugs were kept, some of the shops stored drugs in the same shelves as other general sale items such as foodstuffs while others cooked their food in the same room that they stored the drugs in and none of them had pharmaceutical waste disposal systems and just relied on the pit latrine to damp the expired or damaged drugs.

On many encounters with their customers, most of the medicine sellers in Gesima location simply sold what the customers requested for and all of them do not routinely make a request for a prescription from a trained healthcare professional whenever the customer requests for a certain antimalarial drug and neither does a majority enquire about the illness of the customer. However, a few medicine sellers did ask or explain some of these important issues to the customer but the information was often highly varied in accuracy and quality especially on how to take the medicines. As with other findings elsewhere (Twebaze, 2001, Murray *et al.*, 1998), malaria prevention information was rarely shared with the customer by the medicine seller.

Consumers in Gesima location need access to accurate and understandable information with regard to the potential benefits and risks associated with the use of antimalarial drugs including those consumed through the practice of self-medication. Ways of encouraging clinical and laboratory consultation such as public education are necessary and they could involve highlighting problems that may arise from

inappropriate self medication use such as the antimalarial drug resistance discussed in this study. Though regulations on registration of pharmaceutical businesses and those that categorise most of the antimalarial drugs as prescription only drugs exist, enforcement is lacking. In this study, none of the shops stocking and selling antimalarial drugs in Gesima location were legally authorized to do so. In Tanzania, 90% of drug stores illegally stocked prescription only antimalarial drugs, most stocked unregistered products and all drug store staff were unqualified (Goodman *et al*., 2007) while in Uganda 60% of chloroquine purchases reported in a household survey came from sources not authorized to provide antimalarial drugs (Adome *et al*., 1996).

Strengthening regulatory control has posed great challenges because of the lack of enforcement capability even in other parts of sub Saharan Africa (Goodman *et al*., 2004). In Dar-es-Salaam, more than half of the pharmacy owners rated the government's effectiveness in regulating the pharmaceutical sector as low or very low while in rural Tanzania regulatory infringements were argued to reflect a combination of infrequent regulatory inspections, a failure of regulatory authorities to implement sanctions and successful concealment of violations (Mujinja *et al*., 1999). In addition, even if enforcement was possible, having and enforcing a strict prescription policy without providing adequate and affordable access to medical consultation and treatment might exclude the poorest from accessing drugs leading to increased morbidity from an otherwise treatable infectious disease. Further, Gesima location is poorly served by health facilities and self-medication particularly with antimalarials might do the community more good than harm. It is however important that such self-

medication be accompanied by appropriate training of all concerned on how to use antimalarial medicines appropriately and effectively.

5.2 Conclusion

There is a high magnitude (83.1%) of self medication with antimalarial drugs among adults living in Gesima Locaton, Masaba District. This could reflect the trends in the entire rural highlands of Gusii due to the high malaria incidence during certain seasons of the year and the similar socio-economic and demographic conditions. The major reasons for self medication were cited to be convenience, lower cost and the saving of time in avoiding going to the health facility. Self medication with antimalarial drugs was found to be higher in people of intermediate incomes, in younger people of a mean age of about 30 years, and in those households with an intermediate number of household members. The major sources of antimalarial drugs used for self medication are the drug shops and general retail shops which were all stocking and selling antimalarials drugs illegally. This rampant availability of antimalarial drugs in the informal sector contributes enormously to the practice of self medication with these drugs. Retail regulation of pharmaceutical businesses is ineffective in Gesima location. The drug law enforcement agencies need to be more stringent and extend their reach even to the rural areas where a majority of the population accesses their medicaments from informal drug outlets. Though self medication is difficult to eliminate, interventions such as dissemination of information about advantages of seeking healthcare services from qualified healthcare professionals through media, health education sessions, and posters among others can be made. Similarly, the Ministry of Health and all stakeholders must come together and facilitate ways so as to enhance health service delivery institutions so that more

people can have access for utilizing health facilities. Given the growing global concern with emerging dynamic antimalarial drug resistance patterns and the accompanying social, economic and psychological burden on societies, the findings of this study have important public health policy implications for the regional health officials and administrators in Gesima location and in Masaba district at large.

5.3 Recommendations

Based on the above findings the following recommendations are suggested.

1. The government needs to acknowledge the important role played by informal medicine sellers in the provision of antimalarial drugs to communities in the rural areas and formulate a clear and effective policy on training them to be safe providers of antimalarial drugs.
2. Public awareness and sensitization campaigns to educate the public on the importance of consulting a qualified health care professional whenever they fall sick should be conducted.
3. Regulatory control on the stocking and dispensing of antimalarial drugs needs to be strengthened and enforcement of legislation governing this trade effected.

5.4 Suggestions for Further Research

To bring more light into the issue investigated in this study, it is suggested that the following studies be conducted.

1. A similar study in an urban set up in the highlands of western Kenya needs to be conducted to establish if findings of this study hold true for the entire region.

2. A study quantifying the negative effects of self medication with antimalarial drugs needs to be done in Gesima location in order to investigate the impact of this practice and its effect on the health status of the residents of Gesima location.

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APPENDICES

APPENDIX I

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

I…….have been asked to participate in a research study entitled **Self Medication with Antimalarial drugs in Gesima Location, Masaba District** conducted by Douglas Oseko Bosire of Moi University, School of Public Health as the Principal Investigator.

The procedures, purpose, potential risks and possible benefits regarding this study have been explained to me.

There may be no direct benefits to me for participating in this study and there are no risks to me in participating in this study.

I will answer questions regarding self medication practices with antimalarial drugs for purpose of the study.

I understand that I am under no obligation to participate in this study. I have also been informed that I may withdraw my consent and discontinue my participation at any time of this study.

All information obtained in this study will be confidential and used only for the purpose of this study. My identity will be kept confidential and privacy is assured.

I have read this consent form/this consent form has been read to me and I fully understand it. I agree to participate in this research study and sign this consent form in full acknowledgement of the above;

Participant…….. Signed……

Date……

APPENDIX II

COMMUNITY RESEARCH QUESTIONNAIRE

Date_____

Number_____

Village_____

(i) Background information

1. Who is the participant?

   (a) Self ☐

   (b) Child ☐

   (c) Other ☐ Please Specify……..……

2. If (b) or (c) in Qn. 1 above, what is your relationship with the respondent?

   (a) Mother ☐

   (b) Father ☐

   (c) Brother ☐

   (d) Sister ☐

   (e) Husband ☐

   (f) Wife ☐

   (e) Caretaker ☐ Please Specify……

3. Gender of Participant:

   (a)Male ☐

   (b)Female ☐

4. Age……...

5. Marital Status: (a) Married ☐ (b) Single ☐ (c) Other ☐

   Specify……

6. What is the total number of members in your nuclear family?.....

7. What is your highest level of education?

   (a)None ☐

   (b)Primary ☐

   (c)Secondary ☐

   (d)University ☐

   (e) Other ☐ Specify……..

8. What is the approximate distance to the nearest health facility?.....

(II). Socio-economic status

9. What is your employment status?

   (a) Formal employment ☐

   (b) Informal employment ☐

   (c) Unemployed ☐

10. On average, how much do you earn per month (in K.Shs)?

(a) Below 1000 ☐

(b) 1000-5000 ☐

(c) 5001-10000 ☐

(d) 10001-20000 ☐

(e) above 20000 ☐

(III) Antimalarial Drug Use Information

11. Have you fallen ill with malaria over the past six months?

(a) Yes ☐

(b) No ☐

12. If yes in 11 above, how many time have you suspected to be suffering from malaria in the past six months?

……..

13. What did you do?

(a) Went to hospital ☐

(b) Did not go to hospital ☐

14. If (b) in Qn. 13 above, why?

(a) Long distance to the hospital ☐

(b) Lack of money to pay at the hospital ☐

(c) Lack of money for transport ☐

(d) Availability of medicine at home ☐

(d) Don't remember ☐

(e) Other (Please Explain)……....

15. If (b) to Qn. 13, did you seek any medicine?

(a) Yes ☐

(b) No ☐

16. If yes to Qn. 15, where did you seek medicine from?

(a) Drug Shop ☐

(b) Retail shop ☐

(c) Mobile Drug Vendor ☐

(d) Traditional Medicine Man/Woman ☐

(e) Other (Please Specify)……

17. What medicine did you purchase?

(c) Chloroquine ☐

(d) Malaratab ☐

(e) Fansidar ☐

(f) Orodar ☐

(g) Metakelfin ☐

(h) Amodiaquine ☐

(i) Meriquin ☐

(j) Benaquin ☐

(k) Malodar ☐

(l) Homaquin ☐

(m) Malakelfin ☐

(n) Camoquin ☐

(o) Amodiaquine ☐

(p) Cotecxin ☐

(q) Alaxin ☐

(r) Coartem (AL) ☐

(s) Other (please specify)……

18. Do you know the recommended dosage of the drug you bought?

(a) Yes ☐

(b) No ☐

19 If no to Qn. 18, how did you know the right dosage?

(a)Seller explained to me ☐

(b)Read package insert ☐

(c) Other ☐ Please explain..……

20. Are you aware that the drug you bought can cause adverse events to your body?

(a) Yes ☐

(b) No ☐

21. Do you know that the drug you bought expires?

(a) Yes ☐

(b) No ☐

22. Do you know that each drug has its expiry date indicated on the pack?

(a) Yes ☐

(b) No ☐

23. Did you check the label on the drug to see the expiry date?

24. Where did you get information about the drug from?

(a) Neighbour/Friend ☐

(b) Past Prescription ☐

(c) Advertisement ☐ (Please specify)

i. Radio ☐

ii. Television ☐

iii. Newspaper ☐

iv. Posters ☐

v. Other ☐

(Please Specify) …….

(d) Health Worker ☐ (Please Specify)…….

(e) Other ☐ (Please Specify)…….

APPENDIX III

DRUG SHOP/RETAIL SHOP QUESTIONNAIRE

Date_____

Number_____

Village_____

1. What is the classification of your shop?

   (a)Drug Shop ☐

   (b)General Shop ☐

   (c) Other ☐ (Please specify).....…… ……

2. Are there cases where patients come to your shop for specific medicines without prescription?

   (a) Yes ☐

   (b) No ☐

3. If yes to 2, are antimalarials some of the drugs your customers request for without prescription?

   (a)Yes ☐

   (b)No ☐

4. From Qn. 3, which antimalarial drugs are mostly bought and used for self-medication by your customers?

   ……

   ……

……

……

……

……

5. What are the antimalarial drugs normally stocked at your shop (brand names)?

……

…..……

……..……

……..

6. Do you enquire on the customer's condition before dispensing the medicine they ask for?

(a) Yes ☐

(b) No ☐

7. If no to 7, do you recommend change of medication?

(a) Yes ☐

(b) No ☐

8. What is the patient's response to your recommendation?

……

……

9. Do you explain to your patients the importance of fully complying with the recommended dosage regimen?

(a) Yes ☐

(b) No ☐

10. Do you explain to your customers the dangers of self medication with antimalarial drugs?

(a) Yes ☐

(b) No ☐

11. Where do your customers tell you they got the information about the antimalarial drug from?

(a) Neighbour/Friend ☐

(b) Past Prescription ☐

(c) Advertisement ☐ (Please specify)

vi. Radio ☐

vii. Television ☐

viii. Newspaper ☐

ix. Posters ☐

x. Other ☐ (Please Specify)……

(d) Health Worker ☐

(e) Other ☐ (Please Specify)……

12. Approximately, what is the proportion of customers who buy antimalarial drugs without prescription from your shop?

    (a) Everyone ☐

    (b) 1 in every 2 ☐

    (c) 1 in every 5 ☐

    (d) 1 in every 10 ☐

    (e) None ☐

    (f) Other ☐ (Please specify)…….

13. May I kindly see the certificate of the person in charge?

    (a) Present ☐

    (b) Absent ☐

    (c) Other ☐ Please specify……

14. If (a) in 18 above, qualification of the person in charge?

    (a) Diploma in Pharmaceutical Technology ☐

    (b) Bachelor of Pharmacy (B.Pharm) ☐

    (c) Doctor of Pharmacy (Pharm.D) ☐

    (d) Other ☐ (Please specify)……

15. May I kindly see the shop's licence?

    (a) Present ☐

    (b) Absent ☐

    (c) Other ☐ Please specify……

16. If (a) in Qn. 20 above, type of licence?

(a) Wholesale Chemist ☐

(b) Retail Chemist ☐

(c) Other ☐ Please specify……..……...…

17. What is your recommendation on how to encourage appropriate self medication?

……

……

…….....

.....

Appendix IV:

Map of Gesima Location