SOCIO-ECONOMIC FACTORS IN COMMUNITY-BASED MALARIA
CONTROL IN CENTRAL DIVISION OF GARISSA DISTRICT, KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

To my mother Hawa Ali Adan who took me to school despite being illiterate herself and my sisters Zeinab Shariff, Amina Shariff and Dahaba Shariff for their continuous support.
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DEFINITIONS, TERMINOLOGIES AND ABBREVIATIONS

Endemic: The habitual presence of a disease within a given geographical area.

Epidemic: The occurrence in a community or region of a group of illness of similar nature clearly in excess of normal expectation and derived from common or propagated source.

Incidence: The number of new cases of a disease that occur during a specified period of time in a population at risk of developing the disease.

Prevalence: The number of affected persons present in the population at the specific time divided by the number of persons in the population at that time.

Relative risk: The ratio of the risk of disease or death among the exposed to the risk among the unexposed.

Sulfadoxine pyrimethamine (SP): Is the combination of two different drugs used for the treatment of malaria; one tablet of SP contains 500mg of Sulfadoxine and 25mg of pyrimethamine.

Roll back malaria: The partnership working worldwide to halve the burden of malaria by 2010.

CHW: Community Health Worker.

DEET: Diethyl N-N toluamide.

ITN: Insecticide Treated Nets.

IPT: Intermittent Preventive Treatments.

KABP: Knowledge, Attitude, Behaviour and Perception.

KAP: Knowledge, Attitudes and Practices.

RBM: Roll Back Malaria.

USAID: United States Agency for International Development.


WHO: World Health Organization.
ABSTRACT

Malaria is one of the leading parasitic diseases causing morbidity and mortality in developing countries. In Kenya, it is one of the leading causes of death and accounts for 13% of all deaths reported in government hospitals. Many approaches have been attempted to develop an ultimate solution to malaria, including development of vaccine, without much success. It is generally accepted that prevention and prompt treatment of the disease are the best approaches as for now. Households and communities are the cornerstone to sustaining this intervention. Therefore, there is need to get data that can be used in the control of the disease. This study determined the socio-economic factors influencing malaria control at community level in Central Division of Garissa District. A total of 340 respondents were interviewed. Data was collected through structured questionnaires and focus group discussions. Information on household income, household size and knowledge, attitude and perception on malaria was also collected.

Results indicated that communities believe in multiple causes for malaria. Of the 340 respondents, 62.6% associated the disease with mosquitoes. Other causes included dirty water (25.4%) and rain/cold water (12%). Majority (54%) use anti-malarial drugs to treat the disease. In addition, results indicated that communities use other forms of treatment such as herbal medicine and spiritual healing. There was a significant association between education level and the use of herbal medicine ($\chi^2 = 11.036$, df = 3, $P<0.05$). Although, all respondents had very positive opinions concerning the desirability of mosquito nets, they complained of the cost of the nets, hotness and inadequate air circulation as major disadvantages of the bed nets. In focus group discussions, communities were concerned about the safety of the insecticides.
used to treat the nets. The results also indicated that households put high priorities for expenditure as food and school fees. Cost recovery programmes need to consider cash availability. Household and community knowledge on the cause of malaria was generally good as (62.6%) attributed to mosquitoes. However, household sought treatment from other source beside modern medicine for example, 15.9% sought treatment from traditional healers mainly because of lack of money. Community in the study area also believes that inducing diarrhoea is the treatment for malaria. On ITN though the community appreciates its use in the control of mosquito they mainly use past midnight when they retire to the main house, because household members use other structures and open space in the early hours of the night. There is therefore, need for government and non-government organizations involved in malaria control to make drugs and nets available. Where households cannot pay cash they should be allowed to pay in kind. From the results, there is need to address socio-economic issues such as poverty, illiteracy and cultural factors through communities' participation in disease control.
CHAPTER ONE

INTRODUCTION

1.1 General Information

Malaria is one of the leading parasitic diseases causing morbidity and mortality in developing countries particularly in sub Saharan Africa (Eddelson & Perini, 2000). The disease is transmitted from person to person through an infected female anopheles mosquito bite (Cattani & Lengeler, 1997). Malaria is one of humanity’s worst diseases due to the high mortality it causes to victims. Each year the disease kills more than a million people, many of whom need not have died, considering that malaria is both preventable and curable (Daily Nation, 2003). The majority of victims are children under five years who die because they are unprotected from the parasite and or not treated quickly enough to prevent the disease (WHO, 2000). Therefore, data on community capacity and knowledge on the control of malaria is required in order to institute control measures appropriate to communities.

In Kenya, malaria is one of the leading causes of outpatient morbidity. The disease also accounts for 32% of total new cases reported (MoH, 2002). About 700 people succumb to it daily and more than 25000 infant deaths annually (Daily Nation, 2003). Malaria causes 13% of all deaths reported in government hospitals especially among children aged 1-4 years. Furthermore, the dominant cause of hospitalization is malaria (MoH, 2002). Therefore, there is need to understand efforts towards malaria intervention carried by household members.
In the last decade, the prevalence of malaria has been escalating at an alarming rate especially in Africa. Malaria threatens the lives of over forty percent of the world population (over 2.2 billion), with an estimate of 110 to 200 million clinical cases annually (Fe Ologe & Ssegun-busari, 2003). Children aged under five years and pregnant women are the worst affected (Fe Ologe & Ssegun-busari, 2003). In Africa, it is estimated that between 300 and 500 million cases suffer from the disease with between 1.5 and 2.7 million deaths reported annually (WHO, 2002). Malaria ranks among major infectious disease threats in Africa after pneumonoccal acute respiratory infections and tuberculosis (WHO, 2002). Due to the severity of the disease many approaches have been attempted to develop the ultimate weapon, including vaccine, without much success (MoH, 2001). It is now, generally accepted that the best approach is prevention and prompt treatment (WHO, 2002). Therefore, one way of attaining this could be through empowering communities in home-based management and prompt referrals.

Malaria continues to spread due several factors such as weak health system; large population movements; deteriorating sanitation; climatic change; spreading drug resistance; and in certain cases, uncontrolled development activities (WHO, 2000). Malaria causes high levels of mortality and morbidity in humans. The strategy for malaria control is to prevent death, or reduce illness and decrease social and economic loss due to the disease (WHO, 2002). This would call for research to generate relevant data that could assist in realizing these goals.

The implementation of the above strategy requires provision of drugs for prompt and proper treatment of the disease, management of severe and complicated cases and drugs for prophylactic use by the most vulnerable population, particularly pregnant
women and children below 5 years of age (WHO, 2002). The other facility required is the insecticide treated nets for protection against mosquito bites (WHO, 2002). However, for this goal to be attained, drugs for the treatment of malaria as well as preventive strategies such as the use of treated nets must be made available and accessible to the rural and disadvantaged members of the community. In addition, malaria control programme should consider the plight of the most vulnerable members of the household, for instance, children and pregnant women are known to be affected most by malaria.

After the launch of roll back malaria (RBM), most endemic countries are preparing for a renewed attack on malaria based on the RBM principles and strategies (WHO, 1998). Global commitment to RBM has been secured (WHO, 2000). Now that the plans are in place and the political backing has been secured, we need to ensure that unprecedented action follows. It is vital that we recognize the importance of health behavior research both in pre-programme health assessment and in planning health intervention that is culturally, economically, and socially appropriate. Therefore, community-based intervention is in part dependent on sound analysis of relevant social groups (Shelley & Mwambe, 1998). Traditional methods to control the disease are declining in efficacy and malaria is on the increase (WHO, 2000). Therefore, urgent action is required if lives are to be saved. This calls for research to generate the more needed data on socio-economic factors to be attended in specified communities.

The costs of malaria are enormous when measured in economic terms. Highly malarious areas are among the poorest in the world, and have typically very low rates of economic growth (WHO, 2000). Although, malaria is not a simple consequence of poverty, the wealth of the households and social perception however, does play a
substantial role in determining whether family members receive treatment for fever/malaria and the kind of treatment (WHO, 2002). Whilst there is circumstantial evidence that socio-economic factors may play an important role in malaria epidemic. Very little prospective or retrospective analysis of association between social and economic status of household and malaria control has been undertaken (Shelley Mwambe, 1998). Malaria may have adverse demographic consequences because it substantially raises the chance of infant and child mortality. Therefore, evidence-based approaches such as the results from this study may provide greater credibility to malaria control initiatives in the area by providing information on socio-economic and health-seeking behaviour that will be useful to programme planners.
CHAPTER TWO

LITERATURE REVIEW

2.1 Epidemiology of malaria

Malaria transmission depends on mosquito longevity, density of both mosquito and human, and the mosquito’s man-biting habit (Gordon, 1996). Clinically, the host immune response is also important because people living in endemic areas have partial immunity (Eddleston, & Perini, 2000). The transmission may be measured using either the parasite rate (percentage of blood films which are positive) or the spleen rate (percentage of population with splenomegally) where shistosomiasis is not prevalent i.e S. mansoni (Gordon, 1996). Although the latter is less reliable since splenomegally may be as a result of other diseases (Eddleston & Perini, 2000). Under conditions of epidemic malaria as in the present study area where risk of infection may be very high, spleen rate may be close to nil because exposure is acute rather than chronic (Doolan, 2002). The spleen rate is useful as a relative measure of risk only where stable malaria prevails (Doolan, 2002).

Malaria is transmitted by infected female mosquitoes of the genus Anopheles (Gordon, 1996). Humans acquire the disease when a mosquito infected with Plasmodium parasite bites human (Fe Ologe, & Ssegun-bursani, 2003). Four species of Plasmodium that infect humans are P. falciparium, P. malariae, P. vivax and P. ovale (Munguti, 1998; Eddleston & Perini, 2000). In Kenya, malaria is transmitted by the A. gambiae, s.s., A. arabiensis, and A. funestus. Anopheles Gambiae s.s is common on the shores of Lake Victoria, and northwest of Kisumu (Oigera, 1993).
Epidemiological pattern of malaria varies and is affected by many factors. These include parasite species, human population dynamics, economic conditions, mosquito species, climate and utilization of health services (Munguti, 1998). Therefore understanding community perception of aetiology, symptoms, identification and treatment of malaria is an important step towards the control of the disease.

2.2 Life cycle of malaria parasite

Through the process of feeding, an infected mosquito injects the sporozoites into the bloodstream of the host in this case man. The infective sporozoites migrate via the bloodstream to the parenchymal cells of the liver to form merozoites, from the liver, merozoites invade erythrocytes feeding on haemoglobin (Gordon, 1996). Eventually, the erythrocytes rupture releasing heme (malaria pigment). At this point, the infected person becomes a carrier of Plasmodium parasites (Mc Mahon et al., 1995).

2.3 Distribution of malaria

In the past, malaria was generally a worldwide problem, but the disease is now mainly confined to tropical countries due to technical, administrative, financial and social factors (WHO, 2002). The problem of controlling malaria in these areas is aggravated by inadequate health structures and poor socio-economic conditions (WHO, 1995). The situation has become more complex over the years with the increase in resistance to drugs normally used to combat the parasite that causes the disease. Resistance of vectors to insecticides used in their control also poses a problem in control (WHO, 1995). Globally, malaria threatens the lives of over forty percent of the world population. Cerebral malaria is the most common complication and cause of death in p. falciparum infections, occurring in as many as 50% of all such cases admitted to hospitals and 80% of all fatal malaria cases (Fe Ologe, et al., 2003). Malaria has been
estimated to contribute 2.3% of global disease burden and 90% of the disease is in Africa South of the Sahara (WHO, 2002).

Fig. 1: The life cycle of *plasmodium* (source WHO, 2000)

**THE LIFE CYCLE OF *Plasmodium* spp. (CAUSING MALARIA IN HUMANS)**

The mosquito injects sporozoites into the human when it feeds. The gametocytes fuse in the vector's gut, sporozoites are produced, and the sporozoites migrate to the vector's salivary glands. The gametocytes are ingested by a mosquito when it feeds on blood. In the red blood cells, some merozoites will develop into male and female gametocytes. The parasites reproduce asexually in the red blood cells. The blood cells burst releasing merozoites. This process continues, destroying significant numbers of red blood cells and causing the paroxysms ("chills and fever") characteristic of malaria infections.

(Parasites and Parasitological Resources)
2.3.1 Distribution of malaria in Kenya

The Ministry of Health in Kenya, and the Kenya Medical Research Institute have already identified malaria hot spot areas as 21 district among them Garissa district (MOH, 2003). The result from this study may boost the existing knowledge and provide vital information on the control of the disease. The level of endemicity of malaria in Kenya varies from region to region. It ranges from hyper- to holo-endemic in areas of coastal and lake regions to the malaria free areas on the very high grounds on aberdares ranges and around Mount Kenya (MoR, 1998).

Unstable malaria occurs in several parts of Kenya (MoH, 1998). These areas are either limited by rainfalls along the north and eastern borders and around lake Turkana or by temperatures among the highland areas of western Kenya and parts of Nairobi (Snow et al., 1998). Despite being regarded as unstable, these are subject to epidemics when climatic conditions are optimal for localized transmission (Snow, et al., 1998).

Malaria accounts, for more than 30% of all reported cases of illness countrywide (MoH, 2001a). In Kenya, where there exists ideal conditions for mosquitoes transmitting malaria, the disease accounts for 8 million outpatient cases in government hospitals each year (MoH, 2001a). Climatic conditions are conducive for outbreaks of epidemic intensity in other areas, such as highlands and semi-arid North-Eastern parts of Kenya endangering entire populations (MoH, 2001b). The assessment of household knowledge, attitude, behaviour and perceptions concerning malaria will go a long way in ensuring that communities have appropriate knowledge on the disease so as to contain the severity during outbreaks.
2.4 Malaria control strategies

2.4.1 Global malaria control initiative

In 1992 at a ministerial conference in Amsterdam, the Netherlands, global malaria control strategies were endorsed with the aim of reducing the disease burden at all levels (WHO, 2002). The 40th session of the United Nation General Assembly in 1994 endorsed the strategy on malaria control and requested WHO to develop action plan for the years 1995-2000. In 1997, the OAU states adopted the Harare Declaration on malaria prevention and control (WHO, 2002). The African summit on Roll Back Malaria was held in Abuja, Nigeria on April 25, 2000 attended by 44 out of the 50 malarious countries and territories in Africa and Cuba (WHO, 2000). These conferences show the significance of malaria as a health problem in parts of the world. The action is necessary to prevent the disease and to avoid or contain epidemics and other critical situation. The technology to prevent, monitor, diagnose and treat malaria exists (WHO, 2001), and coordination of these activities through such a forum is important in controlling the disease. Although, this is a move in the right direction, the objective of the above strategies may be elusive, unless issues of poverty and illiteracy among others, which are widespread in Africa, are addressed as part of global malaria initiative.

2.4.2 Background to malaria control activities in Kenya

Twentieth-century policies with regard to the organization of malaria control activities have being directed from central government, under the administration of the Director of Medical Services (Snow, et al., 1998). The epidemic of 1926, 1937 and again 1940 that appeared in areas previously known to be malaria-free intensified the concern of the colonial government in Nairobi toward malaria control (Snow, et al., 1998).
In an effort to respond to global malaria controls action and Roll back malaria, Kenya, formulated a national plan for malaria control in 1991 and 1992 (MoH, 2001). The plan was launched and the malaria control unit (MCU) set up, under the Division of Vector Borne Diseases to be the operational arm of the National Malaria Control Programme (Snow, et al., 1998).

In 1999, the ministry of health published its heath sector strategic plan (HSSP) for five years, defining malaria as the highest priority for prevention and treatment. The Ministry of health formally reviewed the institutional framework and human resource required to take forward the proposed National Malaria Strategy (MoH, 2001). This led to the change in management of health activities and flow of resources from the traditional vertical programme to horizontal programme i.e. empowering districts and communities to undertake malaria control activities. The Division of malaria control role is only centered on specialized services e.g. advice and quality control (MOH, 2000). National Malaria Strategy (2001-2010) focuses on four strategic approaches:

4. Epidemic preparedness and response.

In addition, there are two other vital cross-cutting strategies as supporting structure for the above. These are -

1. Information, education and communication
2.5.1 Clinical management through effective and prompt treatment

Access to treatment is the cornerstone of any public health programme. In the absence of any 100% effective preventive interventions; (whether vaccine, ITN, vector control), the management of clinical malaria through effective treatment is the most vital and cost effective action globally to reduce the disease burden (MOH, 2001). Therefore it is important that communities have proper access to treatment and management of severe and complicated malaria.

Malaria cases are managed as per the national guidelines on malaria diagnosis, treatment and prevention (MoH, 2001). These guidelines are in the process of change. However, early diagnosis and prompt treatment are fundamental to malaria control and need to be carried out wherever malaria occurs. Effective case management is seen to be a basic human right, which should be made available to all persons at risk of malaria (WHO, 1995).

The biggest challenge in the provision of case management is the emergence of parasite resistance to antimalarial drugs. For instance, resistance of *P. falciparum* to a number of antimalaria drugs has been reported in many countries. Of particular concern is the emergence and spread of parasite resistance to the most widely used, effective, safe and cheap antimalarial drug chloroquine (WHO, 2001). In Kenya, sulfadoxine – pyrimethamine (sp) is currently considered to be the most viable replacement as first line malaria therapy (WHO, 1995). However, despite government hospitals providing the drugs on a cost-sharing basis, in Garissa, accessibility to health facilities, let alone the drugs, are difficult since the average distance to a health centre is approximately 50 km (GoK, 2002). Furthermore, these drugs are not readily available in shops and where they are present, the prices are prohibitively high. There
is also evidence that most Kenyans self-medicate, using shop-bought antipyretics and anti-malarials. For example, a study by Snow et al., (2000) indicates that over 60% of fevers in Kenya are managed during their clinical course with drugs purchased over the counter. Traditional healers are also widely used probably contributing to formation resistance to the drugs (GoK, 2001).

One factor that hinders effective case management of the disease is wrong diagnosis (MoH, 2000). Malaria is an illness usually characterized by fever but its clinical presentation may mimic other diseases, which often makes diagnosis difficult. Malaria can be confused with viral infections like influenza and hepatitis and bacterial infections such as meningitis, and respiratory and urinary tract infections (UTI) (WHO, 2000). Other illnesses it mimics include dengue (WHO, 2000), brucellosis, sand fly fever, viral hemorrhagic fevers and various other diseases. Due to this problem the diagnosis of malaria must be addressed as a matter of urgency since the predominant parasite, *P. falciparum* could rapidly lead to death (WHO, 1995).

The rising cost of health care could probably be one of the factors responsible for the increasing tendency to “wait and see” and self-medication attitude. There is also increasing use of drugs left over from previous episodes, which may not be appropriate, may have expired or may not be complete dosages recommended (Hill, et al., 1996). Studies carried out from other parts of the world have revealed the importance of cost in decision making to seek medical services. From such studies for instance, between 46 – 65% of communities in Ghana cited “no money” as the reason for self-medication (Hill et al., 1996). Other antimalarials introduced to replace chloroquine, such as Fansidar Mefloquin, artemisinin derivatives are much less widely available and far more costly and are known to produce allergies (Fe
ologe & Ssegun-bursani, 2003). The study investigated availability of antimalarials as well as household income generation and whether households prioritize malaria control measures. In addition, household income – generation activities and priorities of household members in choosing how the income is used was assessed.

2.5.2 Management of malaria and anemia in pregnancy

Malaria infection during pregnancy is a major contributing factor to maternal death and low birth weight in infant (MoH, 2002). During pregnancy the placenta acts as a store for malaria parasites because of the existence of chemical receptors called chondroitin sulphate, which is conducive to malaria parasite growth (AMREF, 2000). The presence of the parasite in the placenta interferes with oxygen and nutrient transfer and risk of contracting many other infections and poor mental development (Daily Nation, 2003).

Malaria is a major cause of anaemia in pregnant women in Kenya. It increases the risk of severe morbidity and maternal death (MoH, 2001b). Malaria infection during pregnancy poses a risk to the unborn child and leads to decreased birth weight (MoH, 2001b). Studies in Kisumu and Kilifi districts in Kenya have demonstrated significant reduction in the incidence of anemia among pregnant women following the administration of two intermittent presumptive treatment course of Sulfadoxine pyrimethamine in the second and third trimesters (MoH, 2001b). In addition there is strong evidence to suggest that the incidence of low birth weight babies are reduced following intermittent preventive treatment (IPT) with SP (Praise & Shulman, 1998).
The government of Kenya, in its policy on reproductive health, states that all pregnant women living in malarious areas should have access to two free SP treatment doses (25mg/kg/dose) MoH, 2000). One should be in the second trimester of pregnancy between 16 and 27 weeks of gestation and the other in the third trimester between 28 and 36 weeks of gestation or other prophylactic regimen which may evolve (MoH, 2001). This policy is important in the study area where there is epidemic because symptomatic disease occurs and pregnant women are at an increased risk of severe *falciparum* malaria, particularly in the second and third trimester (Gordon, 1996). The adverse effect of malaria on birth weight now extends to the first three pregnancies (Gordon, 1996). If pregnant women develop severe malaria, foetal weight loss is common and the maternal mortality is high. The policy further states, that effective community based communication should be encouraged for prompt treatment of fever among these groups (MoH, 2000). This increases the utilization of antenatal health services as part of efforts to strengthen safe-motherhood. Therefore, this study reported here assessed awareness of the community on the vulnerability of pregnant women to malaria infection as well as the knowledge on Intermittent Preventive Treatment.

2.5.3 Malaria vector control using insecticides

Prevention of malaria encompasses a variety of measures that may protect a patient from developing the disease. These measures are mainly directed against the vector mosquitoes and malaria-causing parasites. The implementation of the vector control component involves the selective use of methods based on personal protection, use of insecticides, environmental management and biological control (Cattani, *et al*., 1997). As part of the continued efforts to address malaria, the World Health Organization has
advocated for the use of insecticide treated nets as one of the tools in malaria prevention and control programmes (USAID, 1997).

Insecticide treated mosquito nets (ITN) and other materials are options, which combine one aspect of personal protection (mosquito nets) with insecticides (USAID, 1997). The desirability of ITNs need to be assessed because the use of nets may not work in some places, presumably because of different human and mosquito behaviour (WHO, 2001a). The ITN is a relatively new innovation. The efficacy of ITN in reducing mortality has recently been demonstrated on trials but large-scale operations remains rare (Hill, 1992). The work her assessed the use and desirability of nets in the study area.

Nets have important cultural and economic implications for the communities concerned. For most people the major concern is the nuisance value of mosquito rather that malaria risks (WHO, 2000a). Therefore, there is need to understand people’s knowledge of malaria, their beliefs and perception of preventing the disease. One reason being that there is considerable variation in the link between malaria and mosquitoes (WHO, 2000a). Furthermore, availability of nets is limited in most parts of Africa due to cost and other logistics. In Kenya, there are no national figures on usage of nets, but research in various parts of the country suggest that the use of nets by pregnant women and children is often as low as 5-10% and very few of these nets are treated with insecticides (MoH, 2001b). So there is need to create a greater demand for nets through awareness and availability through subsidies.

There are about 20 million Kenyans at constant risk of malaria (MoH, 2001). This population would require not less than 10 million treated nets and at least 10 million
insecticide treatments per year (MoH, 2001b). An average household size in Garissa is 8 persons. More often, the only bed net available is used by the head of the household and not the most vulnerable (children or pregnant women) members of the house. In addition, the district has a very low awareness of the disease due to illiteracy despite many people losing their live due to illnesses related to malaria (GoK, 2002). There is need to determine the use of nets used and factors that influence household sleeping patterns that potentially influence how mosquito nets are be used.

To estimate the number of mosquito nets needed for a family depends on whether all members or only those at greater risk (Children and pregnant women) will be covered. Cultural traditions and gender relationship give preference to male household heads. This may place the most vulnerable members of the household at great risk of contracting the disease. In order to know the number of nets needed for an extended family, one must assess the number of household members, the number of structures used for sleeping and the sleeping arrangement of children, and youth.

A survey carried out in Zambia reveals age, gender and kin relationships as key factors that determine where particular family member sleep and cultural traditions and gender relationships give preference to male household heads as mosquito net users (Shelley & Mwambwe, 1998). The number of nets needed for an extended family depends on the number of household members, the number of sleeping structures used and the sleeping arrangement of children, youth and adults (Shelley and Mwambwe 1998).
Knowledge, attitude and practice (KAP) study had not been done in the study area before. However, studies from other parts of Africa indicate low knowledge on malaria prevention and transmission. For example, a study in Mashonaland in Zimbabwe showed very limited knowledge of means of protection against malaria (Hill, 1992). While, other studies in Ghana revealed only 21-47% of the community members understood that malaria is transmitted by mosquito bites (Ortega, et al., 1994). It is also evident that cost of nets influences malaria prevention and control. For instance, a study in Kisumu, showed that 85% of the population knew that malaria is caused by the bite of a mosquito but only 12% used mosquito nets for protection, principally because of prohibitive costs of buying nets locally (Hill, 1989). African leaders committed themselves in the Abuja declaration and pledged to protect 60% of children and pregnant women from malaria through preventive measures (WHO, 2000b). This goal needs to be realized to save the population so that effective malaria control tools may become available to all including people living in the poorest, smallest and most remote villages.

The population living under absolute poverty is estimated at 68% in Garissa district. The community is heavily dependant on relief food from the government and other organizations (GoK, 2002). Studies reveal that the 1997 El-nino rains and floods reduced the number of goat population by 80%, cattle and camel by 20% and 50% respectively, (GoK, 2002). Since the residents rely solely on these livestock as source of income, malaria control measures may be costly without them; hence it may not be a priority in this community.

Studies in Zambia which covered socio-economic characteristics of the household, knowledge of causation of malaria, forms of protection and health seeking behaviour,
revealed that the demand on available cash in the household is great and at the same time, household representatives rated food and school fees as high priorities when choosing how cash is to be used (Shelley & Mwambwe, 1998). The study also revealed that cash is often generated for a particular purpose and then spent on or invested in an immediate need (Shelley & Mwambwe, 1998). The poorest household will be unable to afford purchasing nets or insecticides at commercial prices. Therefore, innovative mechanism will be required to subsidize the purchase of ITNs.

2.6 Health seeking behavior

Health seeking behaviour is a highly complex area incorporating many variables. It is affected both by people’s knowledge and understanding of disease causation and by factors such as cost (American Association For Advancement of Science, 1991). In the case of malaria, as with other illnesses, there is also link between belief about illness and steps taken to seek treatment. African populations have traditional perception about disease causation and management ((American Association For Advancement of Science, 1991). Some diseases are considered best treated by conventional medicine, while others are considered the exclusive domain of local traditional health practitioners (Hill, 1991). Decisions to seek conventional medicine for any illness are often considered the last resort (WHO, 2002).

In Kilifi district of Kenya, for instance, a study on perception of malaria among mothers with children less than 5 years revealed malaria as two separate illnesses, which correspond to uncomplicated and severe form (Snow et al., 1998). The former was seen as natural occurrence of fever treated by purchasing drugs while the latter was characterized by fever with convulsion as caused by spirit possessions and was
referred to a traditional healer (Snow et al., 1998; Chavasse et al., 1999). Studies in health seeking behaviour, perception of malaria, treatment and decision-making for health care at home are crucial to malaria control. For example, in the Somali community, what would have otherwise been cerebral malaria as medically defined is considered as spirit possession. Therefore, patients seek treatment from traditional healers.

The work reported here therefore investigated socio-economic factors that influence malaria prevention and treatment. These included duration for which people stay up before retiring to bed whether or not they use nets when it is too hot, places/where people sleep (do they sleep outside the house or inside?). A household survey in Burkina Faso revealed that only 20% of households had nets of which, most were full of holes and too expensive to replace (Hill, 1991). However, 80% had curtains (USAID, 1997). There was also the problem of lack of beds. Communities in this area indicated that there was no need to have a bed net unless one had a bed (Chavasse et al., 1997; USAID, 1997). Therefore, malaria programmes must start with encouraging the use of bed nets. The solution to malaria problem must take into consideration what people think and do and what their whole perception and attitudes about the disease.

2.7 Economic status and household decision making

The spread of malaria as a disease is influenced by social, cultural and economic factors (WHO, 2000). These factors must be understood and incorporated in the design and implementation of malaria control programmes. It is apparent that social and economic factors influence people’s decision regarding whether to seek treatment or not (Mwenesi, 1993). These decisions are not often made by those who are most
directly affected by malaria i.e. children and pregnant women, but by husbands or senior members of the community such as village elders (Mwenesi, 1993). The author reported that almost all Kenyan coast mothers took advice from family members especially the husbands before taking a child to a health facility. This reflects the role of male in these societies. Therefore, assessing the knowledge and attitudes of male head of household will go a long way in control of malaria.

Furthermore, malaria treatment and control may be complicated if the husbands and senior male members of the community do not see health as a priority. It is significant to understand who in the household makes decisions pertaining to treatment of patients and who is given the priority in order to focus health campaigns and empower the disadvantaged in the society. Communication pattern among the community living in Central Division are important avenues for control intervention. We are aware that creating demand for health services and technologies depend on community education. In an economically diverse community there are different types of communication channels one needs to deliver health messages. Malaria may have adverse demographic consequences by raising the chances of infant and child mortality.

WHO report (2000a) indicates that households respond to this increased risk, by having more children. Therefore increasing the overall rate of population growth. In addition, the investments, which parents of many children can afford to make in the wellbeing of each is limited so that level of health care and education per child tends to be reduced (WHO, 2000a). Malaria takes an enormous toll on human health and well-being and the greatest burden is felt at the household level. Therefore, support and encouraging community based initiative for early diagnosis and treatment will
assist in the management of the disease. It is in this respect that the rationale for the study was developed.

2.8 Rationale for the study

2.8.1 Statement of the problem

Malaria is a major public health problem in more than 90 countries inhabited by 40% of the world population (WHO, 2001 C). In tropical Africa the total cost of malaria in terms of health care, treatment and lost productivity is estimated to be over US$1800 million a year (WHO, 2001 C). The gravity of the disease calls for concerted efforts to combat the menace.

Early diagnosis and prompt treatment using effective anti-malarial drugs and disease prevention through use of ITN are key component of current global malaria control strategies (Alaii, et al., 2003). For Africa, where the malaria mortality burden is highest and health services are not within easy reach the goal is to ensure that drugs are easily available and people have adequate knowledge on their use (Alaii, et al., 2003). A review of result of efficacy of ITNs in sub-Saharan Africa concluded that their correct use could save up to 6 lives for every 100 protected children < 5 years (Lengeler, 2002). However, ITN coverage remains below 10% of the Kenyan population while insecticide re-treatment rates decline dramatically with the introduction of cost recovery systems (Kachur, et al., 1999).

Of major concern is whether people are willing to purchase bed nets and insecticide routinely to protect them against malaria. In addition, better understanding of people’s perception of malaria and its perceived cause, preventative action and value attached to ITNs is needed for planning community-based malaria control programmes (Binka &
ITNs is needed for planning community-based malaria control programmes (Binka & Adongo, 1997). Therefore, studies investigating perception about malaria, malaria prevention and use of ITN among communities would contribute to control of the disease.

2.8.2 Research questions

- What are the knowledge, attitude, behaviour and perceptions of the community towards malaria?
- What socio-economic factors influence treatment-seeking behaviour in the study area?
- Does household income influence malaria control in Garissa District?

2.8.3 Justification

Malaria poses a significant challenge to public health and social-economic development in Africa. Furthermore, the recent upsurge of malaria in non-endemic areas with explosive epidemics in many parts of Africa is probably caused by many factors. These factors need to be determined. Traditional public health research focuses on individuals identified (patients) and enumerated in population based surveys. Although these methods determine relative risks, they typically give little attention to social units such as households and community organizations. It is only recently that in-depth community studies emerged as a priority in malaria control programmes. Since household and community organizations are the cornerstone of sustaining new technologies and positive behavior over a period of time, they need to be given due emphasis.
behavior plays a major role in malaria transmission. Similarly, malaria intervention should be adopted to specific local, ecological, epidemiological, economic and social conditions. Therefore, the patterns of incidence of malaria, and the cost associated with it may be different in different contexts. No magic bullet can be applied universally. It is in this context that this study specifically concentrated on identifying social economic factors influencing malaria control in Central Division of Garissa District as a way of getting information useful to empower community organization in appropriate interventions. In addition, the information will be useful to policymakers and programme developers in implementing programmes pertaining to malaria control using social human behavior as an integral part in defining strategies against malaria.

2.8.4 Hypothesis

Socio-economic and behavioural factors do not influence malaria control in Central Division of Garissa District.

2.9 Objective of the study

2.9.1 General objective

To determine the influence of socio-economic factors on malaria control interventions among community members in Central Division of Garissa District.

2.9.2 Specific objectives

1. To establish household and community knowledge, attitude, behaviour and perception (KABP) concerning malaria control.
2. To investigate socio-economic factors that influence health seeking behaviour and use of insecticide treated nets in the study area.

3. To establish the different types of treatment and care households use for malaria prevention and treatment.
CHAPTER THREE

MATERIALS AND METHODS

3.1.0 Study area

The study was carried out in Central Division, Garissa District, in North Eastern Province (Fig. 2). The district borders the Republic of Somalia to the East, Lamu District to the South, Tana River District to the West and Wajir District to the north. The population is predominantly of Somali tribe, which is known for its nomadic and pastoralist lifestyles. The district covers an area of 33,620 km² and is administratively divided into 11 divisions, 42 locations and 60 sub-locations (GoK, 2002). The Central Division covers 858.7 km² (GoK, 2002) with 5 locations. The district houses the biggest number of refugees in the country forming a population of 130,000 people. This accounts for 35% of the district’s total population of 395,000 (GoK, 2002).

The division is semi-arid and hot most of the time in the year and receives rainfall in two seasons. The long rains runs from April to May and the short rains from October to December (GoK, 2002). However, the rainfall is unpredictable and sometimes with short torrential down pour. The Central and Southern Divisions are the only ones through which the permanent Tana River passes. The Division has the largest population in the District and accounts for 20% of the population. The division serves as a safety net for those who lose their livestock due to prolonged droughts to seek informal employment. Others find it convenient to receive relief food and stay with relatives (GoK, 2002). This has led to the creation of informal settlements within the Central Division but with no corresponding improved health and sanitation services.
Fig. 2: Map of the study area (inset map of Kenya showing the position of Garissa District)
3.2 Study population

3.2.1 Inclusion criteria

The study included all household heads living in Central Division of Garissa District. Where household heads were not available during time of interview, their spouses or other members who were above 18 years of age were interviewed. The objective of the study was explained carefully, clarifying that participation was voluntary.

3.2.2 Exclusion criteria

Household heads who declined to participate in the interview were excluded. Where household heads were present at the time of interview, all other members of the house were excluded from the interview. However, in some instances, where household heads are male, mothers were interviewed to obtain valuable information whenever possible.

2.3.3 Ethical considerations

Clearance for the study was obtained from the Ministry of Education and other relevant bodies. Further permission was sought from the provincial administration Garissa, household heads and community leaders. The purpose of the study was clearly explained to the participants while requesting them to sign informed consent forms as a sign of willingness. The study findings were available to community members, local administration and the provincial administration.

3.3 Study design

The study being reported here was a cross-sectional survey on social demographic and economic factors that influence malaria control. Both qualitative and quantitative
behavioral data were obtained from households based on their socio-economic and health behaviour through a structured questionnaire and focus group discussions (Taylor, 2002). The selected variables to be measures were social, demographic, economic status and health-seeking behaviour.

3.4 Sampling and sample size determination

The sample size was determined using Fisher et al., (1998) standard formula that arrived at 340 respondents. The sampling method was determined using probability sampling (Taylor 2001) as follows. The study area has 8 clusters as contained in the Kenya National Census of 1999, and they are Township, Galbet, Waberi, Madina, Iftin, Korakora, Jeriota and Bouralgi. Out of these, 5 clusters were selected randomly through the use of random numbers. Each of the 8 clusters were given specific numbers and put in a basket out of which these five were selected: Township, Galbet, Madina, Iftin, and Waberi.

The populations in these clusters vary and to maintain an equal representation, a proportion commensurate to the number of household in the clusters was calculated (Taylor 2001). The sample size for the varies clusters were as follows:-
### TABLE 1: Number of household sampled from each of the five clusters

<table>
<thead>
<tr>
<th>Clusters</th>
<th>Total no. of households</th>
<th>No. of household sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Township</td>
<td>4194</td>
<td>115</td>
</tr>
<tr>
<td>Galbet</td>
<td>3843</td>
<td>106</td>
</tr>
<tr>
<td>Madina</td>
<td>878</td>
<td>24</td>
</tr>
<tr>
<td>Waberi</td>
<td>1221</td>
<td>34</td>
</tr>
<tr>
<td>Iftin</td>
<td>2229</td>
<td>64</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12365</strong></td>
<td><strong>340</strong></td>
</tr>
</tbody>
</table>

The target population was stratified into units of households and only one member of the household was interviewed using structured questionnaire. For specific household that were interviewed a list of the household was obtained from the area chief or the community health worker in charge of the location and simple random sampling (Hickey, 1996) was used in enrolling household for interview (Hickey, 1986).

#### 3.5 Data collection

A pilot study was done in Dadaab Division to test the questionnaire. Questionnaires were administered to households in Dadaab to ascertain their suitability to meet the
objective of the study. This area was chosen because like the study area, it is a pre-
urban centre with similar characteristics to that of the study area. The population in
Dadaab is cosmopolitan. It also neighbours the study area. Data was collected
through structured questionnaires, which were pre-coded. Data collection from the
household was done from homes and appointments were made prior to the interviews.
Focus group discussions were used to gather qualitative information on socio-
economic factors. The discussions were conducted in groups of 10 in 3 different
sessions. Both the questionnaires and focus group discussions were conducted in the
local language.

3.6 Data management and analysis

Data from the questionnaire was coded and entered into a spreadsheet. The data was
entered into database and transferred to diskettes at the end of each day’s session.
The Software Statistical Package for Social Sciences Version 10 (SPSS) (Taylor,
2001) was used to analyze the data. Analytical techniques were used depending on
the type of data and the variables to be analyzed. Independent and dependent
variables were compared using Chi-square. Independent variables such as sex, marital
status, family size, income and education among others were matched. In the case of
dependent variables measuring health-seeking behaviours, differences were also
compared using Chi-square (Taylor, 2001).
CHAPTER FOUR

RESULTS

4.1 Demographic characteristic of study population

The main characteristics of the study population that might influence malaria control are presented in (Table 2). Results presented in this report include quantitative and qualitative information collected from the study population through structured questionnaire and focus group discussions. The interviews were coded and entered into a spreadsheet, which was analyzed using SPSS. The data is also represented using percentages, graphs, pie chart and tables. Qualitative responses were tape-recorded. From the study on gender distribution, there were more females (57.9%) than male (42.1%). Subsequent analysis on household marital status showed majority of the respondents (60.3%) were married, followed by singles (22.1%) then divorced (9.7%) and lastly widows (7.9%). There was significant relation in marital status, since more women were married than men ($\chi^2 = 1.10$, df = 1 p<0.05). The mean educational level was none; therefore majority of the respondents did not have any formal education (57.2%). Primary schooling was (18.8%) while secondary and University college were (16.8%) and (6.2%) respectively. There was no statistically significant association in the education level between male and females ($\chi^2=10.632$ df = 4 P>0.05)

The average number of women of reproductive age in a household was 2 women making a total of (62.9%) while those with more than 3 women of reproductive age in a household were (21.5%), households without this category were (21.5%).
The mean household size among those interviewed was 7.5 members. Of the 340 households interviewed, 53.2% reported that at least a member of the household had suffered from malaria in the past two weeks. The disease affects many in the community especially pregnant women and children.

4.2 Knowledge attitudes and perception about malaria

4.2.1 Responses on the cause of malaria

The findings of the study show that the community has presumed multiple causes for malaria. These include mosquitoes, dirty water, rain and cold water. It is important to note that there are multiple beliefs on the cause of malaria and many of those who believed that mosquitoes causes malaria also thought there were other possible causes. Sixty two point six percent (62.6%) of the study population attributed mosquitoes to the cause of the disease, while twenty five point four percent (25.4%) said dirty water and twelve percent (12%) soaked in rain/cold water (Fig. 3).

There was statistically significant association between educational and knowledge on the cause of malaria, since more of the respondents who had an education of secondary school level and above correctly identified mosquitoes as the agents of the disease \( \chi^2 = 2.94 \ df = 1 \ P < 0.05). \)

4.2.2 Health Seeking behaviours

Health seeking behaviour was assessed by inquiring the respondent's actions on treatment seeking and prevention of malaria and maintenance of the same. Multiple responses were allowed where possible as shown by the responses. Three hundred and twenty two (54%) of the respondents indicated that they took antimalarials drugs from a health facility or bought them over the counter while two hundred and thirty four
(39%) indicated that they used herbal medicines whilst forty-seven (7%) of the respondents indicated that they used spiritual healing (Diin) as a method of treatment. There were therefore multiple uses of therapies (Fig. 4).

If one form of treatment failed, other forms of treatments were sought. Alternately two or three forms of treatments are simultaneously combined to get desired effects. Treatment seeking for malaria involved different avenues. Majority (94%) of the respondents reported having used some form of treatment during illness. Of the households interviewed, (83.7%) were using government hospitals for treatment while 9.5%, 6.4%, 0.4% used private clinics, traditional healers and chemists respectively. There is therefore difference in preferred sources of treatment with majority favouring seeking treatment from government hospitals. The community preferred government hospital because the cost of treatment is cheaper as compared to the private clinics.

Asked which form of treatment were most effective against malaria, three hundred and fourteen (92.4%) indicated biomedical drugs (antimalarials) as the most effective treatment. Others were herbs (6.8%) and Diin (0.9%) as malarial remedies. While the least effective treatment, households indicated two hundred ninety nine (87%) as herbs, twenty two (6.2%) responded Diin and 19% (drugs). (Results in fig. 4).

There is a relationship between the educational level and the use of herbal medicine ($\chi^2 = 11.036$ df = 3 P<0.05). More household members with primary school education and above use biomedical drugs than those who had no education (Fig 4).
Fig. 3: Responses on the causes of malaria

- MOSQUITOES: 62.6%
- DIRTY WATER: 25.4%
- RAIN/ COLD WATER: 12.0%

N=340
<table>
<thead>
<tr>
<th></th>
<th>Number of responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>143</td>
<td>42.1</td>
</tr>
<tr>
<td>Female</td>
<td>197</td>
<td>57.9</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>205</td>
<td>60.3</td>
</tr>
<tr>
<td>Single</td>
<td>75</td>
<td>22.1</td>
</tr>
<tr>
<td>Widow/widower</td>
<td>27</td>
<td>7.9</td>
</tr>
<tr>
<td>Divorced</td>
<td>33</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>198</td>
<td>58.2</td>
</tr>
<tr>
<td>Primary</td>
<td>64</td>
<td>18.8</td>
</tr>
<tr>
<td>Secondary</td>
<td>57</td>
<td>16.8</td>
</tr>
<tr>
<td>University/college</td>
<td>21</td>
<td>6.2</td>
</tr>
<tr>
<td><strong>Women of reproductive age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>73</td>
<td>21.5</td>
</tr>
<tr>
<td>1-3 women</td>
<td>213</td>
<td>62.6</td>
</tr>
<tr>
<td>4-7 women</td>
<td>41</td>
<td>12.1</td>
</tr>
<tr>
<td>Over 7 women</td>
<td>13</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>House hold size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 persons</td>
<td>56</td>
<td>16.5</td>
</tr>
<tr>
<td>3-4 persons</td>
<td>72</td>
<td>21.2</td>
</tr>
<tr>
<td>5-6 persons</td>
<td>63</td>
<td>18.5</td>
</tr>
<tr>
<td>7-8 persons</td>
<td>92</td>
<td>27.1</td>
</tr>
<tr>
<td>Over 8 persons</td>
<td>57</td>
<td>16.8</td>
</tr>
</tbody>
</table>

**N = 340**
Fig. 4: Proportion of households using various methods of treatment for malaria

N=340
4.2.3 Mosquito control strategies

Households to reduce mosquitoes around the place where they live relied upon various strategies. Majority of households (49.4%) use personal protection e.g. bed nets, repellants/coils. One hundred and fifty eight respondents (41.2%) used various environmental management practices such as removal of stagnant water, while 1.5% of the households indicated use of chemotherapy and 7.9 % do not use any practice to reduce malaria (Table 3). Two hundred and fifty six (75.3 %) of the respondents usually went back to the hospital/clinic in the event of malaria treatment failing. In alternative treatment, fifty-four respondents (15.9%) sought treatment from traditional healers, thirteen (3.8%) indicated no treatment sought, while seventeen respondents (5.0%) buy medicine over the counter (Table 4).
Table 3: Education level of respondents and use of herbal medicine.

<table>
<thead>
<tr>
<th>Education level</th>
<th>Herbal medicine</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Total</td>
</tr>
<tr>
<td>None</td>
<td>72.8%</td>
<td>27.8%</td>
<td>100</td>
</tr>
<tr>
<td>Primary</td>
<td>76.6%</td>
<td>23.4%</td>
<td>100</td>
</tr>
<tr>
<td>Secondary</td>
<td>54.4%</td>
<td>45.6%</td>
<td>100</td>
</tr>
<tr>
<td>University/college</td>
<td>52.4%</td>
<td>47.6%</td>
<td>100</td>
</tr>
</tbody>
</table>

N = 340
Fig. 5: Education level and treatment seeking behaviour

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Anti-Malarial</th>
<th>Herbal medicine</th>
<th>Diin</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.1%</td>
<td>39.8%</td>
<td>42.0%</td>
</tr>
<tr>
<td>Primary</td>
<td>33.7%</td>
<td>41.5%</td>
<td>52.2%</td>
</tr>
<tr>
<td>Secondary</td>
<td>61.9%</td>
<td>50.1%</td>
<td>50.1%</td>
</tr>
<tr>
<td>University College</td>
<td>61.8%</td>
<td>50.1%</td>
<td>50.1%</td>
</tr>
</tbody>
</table>

N=340
Table 4: Proportion of household practicing malaria control methods.

<table>
<thead>
<tr>
<th>Prevention of malaria</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental management</td>
<td>140</td>
<td>41.2</td>
</tr>
<tr>
<td>Personal protection</td>
<td>168</td>
<td>49.4</td>
</tr>
<tr>
<td>Chemo prophylaxis</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>Nothing</td>
<td>27</td>
<td>7.9</td>
</tr>
</tbody>
</table>

\[N = 340\]
Table 5: Measures taken when malaria treatment fails

<table>
<thead>
<tr>
<th>Measures taken when malaria treatment fails</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back to hospital</td>
<td>256</td>
<td>75.3</td>
</tr>
<tr>
<td>Traditional healer/herbalist</td>
<td>54</td>
<td>15.9</td>
</tr>
<tr>
<td>Sought no treatment</td>
<td>13</td>
<td>3.8</td>
</tr>
<tr>
<td>Buy medicine/over counter drugs</td>
<td>17</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>340</td>
<td>100</td>
</tr>
</tbody>
</table>

N=340
4.3 Households' economic activities

4.3.1 Household income

Households' economic activities were assessed, by inquiring the main sources of income. These include household head income, and members' properties that generate income etc. Other external sources were also inquired.

Households in the study area were involved in livestock rearing, subsistence farming, business and salaried jobs. The majority of household heads (150) (44.4%) were casual workers. Those who engage in business were seventy seven (22.6%). Seventy five (22.1%) respondents indicated they were salaried. Those who revealed that they had no source of income were twenty two (6.5 %) household heads.

The study also showed that other members within the household had some sources of income. Two hundred and thirty three (68.5 %) members of the household had no source of income. Twenty nine (8.5 %) were salaried and those who were in business were twenty eight (8.2%) while five (1.5%) respondents were farmers.

Majority of households (223) (65.6%) had no livestock or other animals with 39 (11.5%) having cattle of between 1-5 stocks, while 25 (7.4 %) were having cattle over 10 stocks. Nineteen (5.6%) households had camel of stock between 1-5. Households with goats of between 1-5 and more than were 8 (2.4%) and 6 (1.8%) respectively while those with donkey were 4 (1.2%).

Similarly, households with farmlands were 95 (27.9 %) while majority (72.1%) had no farmland of their own. The total household monthly income from all the main sources converted into cash was assessed.
Majority (45.9%) of households had monthly income of between three thousand to ten thousand while forty-one (12.1%) had a total monthly income of less than three thousand. Those households with income above fifteen thousand were thirty seven (10.9%). The study also assessed external sources of income. Households that received external financial support composed of 22.6% while 77.4 % had no other source of financial support. Household in the study area cited “no money” as reason for using herbal medicine and seeking treatment from traditional healers. They also indicate nets, as expensive especially when household members are many.

4.3.2 Household priority needs

The study assessed the households priority needs by getting information on what would be the order of preference if households were given the chance to prioritize their needs. The majority two hundred and twelve (62.4%) ranked food as first priority need by households. Forty nine (14.4%) ranked food second. Twenty eight (8.2 %) ranked food fourth while thirty and 21 respondents ranked food as third and respectively. School fees was ranked first by one hundred and eight (31.8%) respondents. One hundred and forty two (41.8%) ranked it second need. Fifty nine (17.4%) ranked it third while thirty one respondents ranked school fees as their fourth need of preference.

The other items that the respondents included in their list of preference were cloth and livestock. Thirty four (10.0%) respondents ranked cloth second and one hundred and fifty four (45.3) ranked third sixty one (26.8) ranked it fourth in preference and ninety one (26.8%) ranked it fifth. Majority (45.6%) ranked livestock third. Sixty
nine (20.3%) ranked fourth while 75 (22.1%) respondents and forty one (12.1%) ranked livestock as their second and fifth preferences respectively (Fig. 6).

The study assessed the episodes of malaria in households two weeks prior to the study and found out that there is no relationship between the approximate monthly income of household and two weeks malaria/fever incidence ($\chi^2 = 9.632$ df = 4 $P<0.05$)

4.4 Use of bed nets to control malaria

4.4.1 Net use

All the respondents had used bed nets to reduce mosquito bites. A total of forty eight (14.1%) had used the nets for a period of 1-2 years. The majority (146) (42.9%) used them for over six years, while (78) (22.9%) used them for between 3-4 years and 20% of the respondents having been using the bed nets for between 5 and 6 years.

The study assessed the number of bed nets in a household, compared with the number of household members. Majority (171) (50.3%) had 3-4 bed nets at the time of the study – a total of (75) (22.1%) had 5-6 nets while (72) (21.2%) had only 1-2 bed nets. Twenty two (6.5%) households had more than 7 nets (Table 5). There are a significant difference between the household size and the number of nets ($\chi^2 = 38.628$ df = 12 $P<0.05$).

Majority 218 (64.1%) had no problem using nets. However, 49 (14.4%) said nets are very hot, while 19 (5.6%) indicated that the nets are both expensive and hot to use. Thirteen (3.8%) indicated that nets reduced air circulation/respiration (Table 6). There was no significant relationship between household income and responses on difficulties in using nights ($\chi^2 = 10.02$, df =16 $P <0.05$).
Fig. 6: Household priority needs

- Food: 62.4% 1st Rank, 14.4% 2nd Rank, 8.2% 3rd Rank, 6.2% 4th Rank, 8.8% 5th Rank
- School fees: 41.8% 1st Rank, 31.8% 2nd Rank, 17.4% 3rd Rank, 10.0% 4th Rank, 0.0% 5th Rank
- Clothes: 45.3% 1st Rank, 26.8% 2nd Rank, 17.9% 3rd Rank, 0.0% 4th Rank, 0.0% 5th Rank
- Livestock: 45.6% 1st Rank, 22.1% 2nd Rank, 12.0% 3rd Rank, 10.3% 4th Rank, 0.0% 5th Rank

N=340
Table 6: Difficulties experienced in using nets

<table>
<thead>
<tr>
<th>Difficulties experienced in using nets</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>218</td>
<td>64.1</td>
</tr>
<tr>
<td>Expensive</td>
<td>41</td>
<td>12.1</td>
</tr>
<tr>
<td>Hot to use</td>
<td>49</td>
<td>14.4</td>
</tr>
<tr>
<td>Hot and expensive</td>
<td>19</td>
<td>5.6</td>
</tr>
<tr>
<td>Reduce air circulation</td>
<td>13</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>340</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

N = 340
Majority (63.2%) of household respondents however, said nets reduce/kill mosquitoes while 62 (18.2%) indicated that they provide comfortable sleep. One person indicated that nets provide privacy and 62 (18.2%) did not know the advantage of nets.

4.4.2 Times of the year households use bed nets

Majority 181 (53.2%) uses the nets only during the rainy session or when there are mosquitoes and 149 (43.8%) use them all year round while 10 (2.9%) do not use them consistently. Majority 240 (70.6%) do buy bed nets with insecticide while 100 (29.4%) do not. Out of 50 respondents who used the retreated bed nets, only (14.3%) mentioned pretreatment and re-treatment of nets as necessary.

4.5 Communication pattern

One hundred eleven (32.6%) listened to Kenya Broadcasting Corporation (KBC), (96) (28.2%) do not listen to radio, while (80) (23.5%) listen to British Broadcasting Corporation (BBC), Somali service as well as KBC, and (53) (15.6%) listen to BBC Somali service only. Majority (44.4%) prefers to receive health information that is useful to the family through community meetings. Other avenues included through the health centers (22.9%), small group of neighbors (16.5%), radio (12.9%) and next of kin (3.2%) (Table 7).

4.6 Sleeping pattern

Majority (71.8%) household members do not sleep outside their actual houses and only 28.2% had said some members spend outside the house once in a while. One hundred seventy one (50.3%) had infants under 2 years of age. Out of this 231 one
thirty one (67.9%) children do use bed nets. Majority (106) (31.2%) children leave their mother and sleep alone at the age of 2-3 years. Ninety two respondents (27.2%) at the age of four to five years sleep alone. Others include (84) (24.7%) at 0 – 1 year and 4.4% above 5 years.

Sleeping pattern indicate that majority (166) (48.8%) of the adults retire to bed between 9.00 pm -10.00 pm. While 16 (47.4%) retire after 10.00 pm. For children majority 190 (55.9%) retire to bed at around 7.00 pm – 9.00 pm. Eighty four (24.7%) retire from between 9.00 and 10.00 pm.

Methods used by household members to protect themselves from mosquitoes in the evening before they retire for the evening were investigated. Majority (31.1%) use nothing to protect themselves. Other methods include covering the body with sheets/cloths (26.2%), use of mosquito coils/repellants (68) (20.0%), mosquito nets (63) (18.5%) and burning herbs (13) (3.8%).
Table 7: Means of receiving health information

<table>
<thead>
<tr>
<th>Means of receiving health information</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community meetings</td>
<td>151</td>
<td>44.4</td>
</tr>
<tr>
<td>Small groups of</td>
<td>56</td>
<td>16.5</td>
</tr>
<tr>
<td>Neighbours</td>
<td>44</td>
<td>12.9</td>
</tr>
<tr>
<td>Radio</td>
<td>78</td>
<td>22.9</td>
</tr>
<tr>
<td>Health center</td>
<td>11</td>
<td>3.2</td>
</tr>
<tr>
<td>Next of kin</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>340</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

N = 340
CHAPTER FIVE

DISCUSSION

5.1 Characteristic of the study population

More respondents (57.9%) were females. This could be due to the fact that majority of women are housewives and were available at the time of the interview. The traditional Somali woman is considered to be the backbone of the family in all classes of the society. It is her responsibility to keep the house and bring up children. It is held that a family is what a wife makes of it. The husbands are usually busy in the markets earning to maintain the children and the non-working wife. However the trend of husbands being the providers is changing of late due to the changes in lifestyle from a nomadic to sedentary life and the economic maintain drifting from rearing livestock to formal and informal employments in towns. This has negatively affected the social role of male who were herders and women are increasingly venturing into small businesses to meet household needs. This also agrees very well with the census (GoK, 1999). The ratio of female to male in Kenya was 52:48, implying a generally number of females, though not significant.

Sixty point three percent (60.3%) of the respondents were married. Polygamous relationships contribute to increased number of married households. Although the study findings indicate 22.1% were singles. This could be due to the study allowing interviewing other members of the household like daughters. The average household size was 7.5. The results of this study agrees with a study conducted by the National Census of Kenya in 1999 which indicated an average of 8 persons in a household in the study area. Although this study did not aim at finding the poverty rate, in relation to household, a study by the Ministry of Planning and Finance Kenya (GOK 2000),
that households with large number of members have higher rate of poverty, consequently, this has implication on health seeking behaviour especially where health care is only made available at a fee.

Based on gender disparity and the fact that women are more vulnerable to malaria attacks especially during pregnancy will mean the prevalence of the disease can be slightly higher and malaria control planners need to consider this fact and target the group for prevention. For instance the use of chemoprophlaxis during pregnancy should be initiated as part of the larger prevention and control programme.

5.2 Causes of malaria

The general knowledge on the cause of malaria was good. The English term malaria was widely recognized. The local term *Khaar/Qaanda* (fever) was also used to mean malaria. Further interview indicated that there are different causes of *Khaar Qaanda*. This can lead to misdiagnosis, as there are many diseases that have fever as a major symptom. The situation is worsened, as there are limited laboratory facilities for confirmation of the disease; where such facilities exist, they have not solved the problem either, since there is a tendency of communities self- medicating through drugs bought over the counter. This has a number of implications in malaria control, first there is a risk of drug resistance as it is already experienced, for instance, a study done by Ministry of Health, Kenya (2001a) in Moyale, indicated 40% resistance to SP drugs. Secondly, although the assessment of fever for the diagnosis and treatment of malaria aim to maximize sensitivity, fever alone may have very low specificity for the diagnosis of malaria, hence false prevalence rate may be reported.
The communities recognized symptoms and signs of malaria that are generally consistent with the medical definitions of malaria.

The knowledge on this clinical signs and symptoms by the community is important in the absences of laboratory facilities to confirm the parasitemia, since there is urgent need to manage malaria for it is a killer disease. However, one needs to recognize the overlap syndrome. For example, a child may have more than one disease. Therefore, households should be encouraged to refer cases to the nearest health facility especially if fever persists for proper treatment. Efficient referral system requires linkages between health facilities and community. Therefore, health facilities should decentralize health services to allow community health workers and village health committees as integral part of the health system.

The study findings show that the community believes that there are multiple causes of malaria. The relationship between malaria and drinking “dirty water” may be logically valid especially in the study area. The people’s source of drinking water is the Tana River through water transported in donkey carts. During the rainy session, the river flows muddy water since the water treatment plant serves less than 1/3 of the population. The households consume water directly from the river and incidentally this is the time when mosquito population increases because of the rainwater and the subsequent conducive environment created.

Although 78.2% of the respondents attributed the cause with mosquitoes, the actual role of mosquitoes in the transmission of malaria may not be very clear in the disease aetiology. The study findings also show perceptions of the aetiology of disease may
influence the treatment. For instance some of the respondents indicated the use of laxatives (inducing diarrhoea) to treat malaria.

Beliefs on multiple aetiology may limit the acceptance of measures aimed at treatment and control of the disease. Results from this study indicate those who do not associate the transmission of the disease with the mosquitoes are unlikely to protect themselves from mosquito bites and hence may seek unconventional treatment. This may have implications on the control and the treatment of the disease. Nevertheless, the findings that some community members know that the disease is transmitted by mosquitoes is important especially in implementing a community based malaria control focusing on vector reduction.

5.3 Health seeking behavior

Majority (83.7%) of the communities utilize the government’s health facilities. However, the study findings indicate other avenues that include private clinics (9.5%), traditional healers (6.4%) and Chemists (0.4%). Interestingly, herbal medicine is concurrently used with biomedical prescriptions, since the community strongly believes that inducing diarrhoea and vomiting is the ultimate treatment for malaria. Therefore, various plant based herbs were used to induce diarrhoea and vomiting among them are Mwarubaine (Neem tree), Azadirachta indica A. Juss.

Multiple therapies were very common. This ranged from biomedical, herbal to spiritual. The education level of the respondents has a statistical significance since those with primary education and above used antimalarials more often than those who had no formal education.
This finding is also supported by Munguti (1998). However, almost all respondents (91%) regardless of their education and income believed that when all other treatment fails, *D*ún (spiritual healing) is the last resort.

Majority (75.3%) said they go back to hospital/clinic when malaria treatment fails. It is important to note that 15.9% seek re-treatment from a traditional healer. It is a factual reality that in many malaria areas, people use indigenous herbs in the treatment of the disease. This may partly be attributed to the belief in the potency of medical plants and belief in the aetiology. This belief may lead to the rapid development of drug resistance to the drugs used to treat malaria. Although 78% believed mosquitoes are the transmitters of malaria focus groups observed that, inducing diarrhoea and vomiting was the proper treatment for malaria. This may have a lot of bearing on the prevention and treatment of malaria, as households to treat and prevent the disease may not use conventional methods.

The various forms of traditional treatment include drinking solutions of herbs, smearing of blood on the body, the use of plant concoctions and wrapping animal skin on children were a common treatment. A traditional practitioner essentially does this or parents/guardians of the affected individual. However, at times it is self-administered. WHO (2001a) report reveals that some countries in Africa produce various plant-based preparations that need to be regulated. However, one main reason for the use of traditional treatment is as a result of unavailability of biomedical drugs.

Households indicated that Sp drugs were not readily available in shops despite the government permitting the drugs in the year 2000 to be sold over the counter.
There is need therefore to sell these drugs in the shops and kiosks to make the community to have easy access to the medicine. A Similar initiative was tried in Bungoma Kenya by AMREF through the vendor-to-vendor and neighbour-to-neighbour strategy that aimed at improving private drug retailer dispensing practice in compliance with Kenya’s national malaria treatment policy (AMREF, 2000). This can be replicated in the study area. However, this should be preceded by first training the shopkeepers on the correct dosage of the drugs. In addition, such programmes should create linkages between the shopkeepers and the local health facilities in order to facilitate referral systems in case of need.

Knowledge on the local brand name of antimalarials was very high. The ones commonly mentioned were fansidar, metakelfin and chloloquine. However a few did list panadol and aspirin (analgesic and anti-pyretic) as antimalarials. This may have some implication on malaria treatment since appropriate treatment may be delayed. Effective case management of malaria at the community level may be curtailed by beliefs people have about malaria. For example, in the focus group discussions, community members gave malaria a two-tier classification, which is based on observable symptoms. In this two-tier, cerebral malaria is considered as the most complicated. Unfortunately, cerebral malaria is usually linked with Jiin (spirit), than infection by *P. falciparum*, due to the *P. falciparum*—mosquito and human missing link in the cerebral malaria folk classification system, Medicine may be withheld from those who thought to be suffering from cerebral malaria in favour of other alternative intervention.

The uncomplicated malaria is characterized by the presence of a fever, which is the most significant symptom. This finding is also supported by Nyamongo (2000), in his
study on the synthesis of malaria research studies and IEC issue arising through Education Television Network on behalf of the ministry of health in Kenya. A study done by Schultz, et al., (1994) in Malawi on malaria and child bearing women knowledge, attitudes and practices observed that as women uniformly considered malaria to be a problem in pregnancy and most believed that anti-malarials are effective in curing malaria. Fewer respondents believed that they are effective in preventing malaria. In the focus group discussions women in the study area virtually did not know the intermittent preventive treatment (IPT) given to pregnant women as part of the reproductive health policy in Kenya, but, they did mention anti-malarials as some of drugs they are given when they visit the antenatal clinics. This indicates inadequate awareness among this group. Although the ministry of health administered IPT to all pregnant women visiting government hospitals, it is important for people to know about the prophylaxis in order to increase awareness and probably sustain the behavior through antenatal women voluntarily seeking prophylaxis.

5.4 Prevention of malaria

5.4.1 Strategies used to control mosquitoes at homesteads.

The community used a number of methods to ensure mosquito control within their households. This study categorized the control methods into personal protection, environment management, and chemoprophylaxis. Majority (49.4%) use personal protection for example, treated bed nets, untreated bed nets, mosquito repellant and coils. The increased use of personal protection may be due to current publicity given to bed nets both by the ministry of health and its availability on cost sharing basis at the local PHC.
Communities also use smokes of various kinds to deter mosquitoes from entering the house. Many different materials are used to produce aromatic smokes. Several plants such as the oil from neem fruit and leaves are widely used as protection against mosquito bites. The study finding also agrees with studies carried out by Nyamonya (1992) among the Kamba, Duruma, Busii, Tharaka in Kenya. These reported the use of indigenous plant to deter mosquitoes. However this practice is only marginally beneficial. Spraying with insecticides has been tried extensively in Kenya like in most other tropical countries. However, for reasons of cost, harm to the environment and rapid adaptation of insects to insecticides. This is not promoted so much. The community complained of cost in the use of indoor residuat sprays.

In such circumstances, other simple and cost effective methods should be advocated for. For example, the chances of being bitten by a malaria-infected anopheline mosquito can be reduced considerably by measures like covering exposed skin surfaces and remaining indoors during times when mosquitoes are active and biting. Moreover, as observed by Kachur, et al., (1999) the utilization of curtains on windows and doors are effective in reducing child mortality and morbidity. These strategies can be an alternative solution to the hotness experienced in the use of nets by the study population.

5.5 Household economic activities

One of the greatest challenges facing the government of Kenya at independence, some forty years ago was how to reduce widespread poverty among its citizens. Poverty, ignorance and disease were identified as a major constraint to social and economic development. While this concern has occupied a central place in Kenya’s development priorities since 1963, the problem of poverty persists (GoK, 2000). For
instance, the population living under absolute poverty is estimated at 68% in the study area, above the national figure, which stands at 57% (GoK, 2002). These have an impact on health seeking as revealed in the results. The communities hardly spare money for healthcare since the demand for cash was high and high priorities for expenditure were food and school fees.

It is apparent that economic factors influence people’s decision making regarding whether to seek treatment or not. Although malaria is not a simple consequence of poverty, poor families may often lack the resources to obtain proper treatment for the disease. Households in the study area are involved mainly in livestock farming. Other sources of income include subsistence farming, business and salaried jobs. However, majority of household heads obtained their living from casual work (44.4%). This was probably due to high illiteracy level as indicated in Central Beaureu of Statistics, (GOK, 2000). The prolonged drought in the area as well as the displacement of families during the El-nino rains in 1997/98 that saw massive loss of livestock and increase of rural-urban and pre-urban settlement contributing to worsening poverty in the area.

Cash within household is extremely limited. Demand on the available cash is great. In response to interview questions and focus group discussions, household representatives rated food and school fees as high priorities when choosing how cash is to be used. Cash is often generated for as particular purpose and often spent or invested on an immediate need.

Similarly, a baseline study conducted by the Ministry of Health in Ghana (Hill, 1989) in four districts observed the importance of cost in consultation decision. Over 46% of
the people in each district cited "no money" as the reason for self-medication. Although one cannot conclude malaria as a direct result of low income, this study observed that household earning of less than 6000 Kenya shillings a month had more 25.9% members of the house suffering from malaria. Two weeks prior to the interview as compared to those (4.4%) earning more than Kshs 15000 monthly.

WHO (2002) report indicated that although people were unaware of the origin of malaria and the mode of transmission, protective measures against the mosquitoes have been used for many hundred years? For example, the inhabitants of the swampy regions in Egypt were recorded as sleeping in tower-like structures out of the reach of mosquitoes. Whereas others slept under nets as early as 450 BC (WHO, 2002).

5.6 Mosquito net use

Malaria control programmes generally are now moving towards the emphasis on personal protection against malaria. Therefore one of the major planks in recent malaria control strategies is the promotion of ITNs. Mosquito nets were the mosquito control product respondents were most aware of in the study area. Since the entire respondents said they had used bed nets, to reduce mosquito bites, the majority (42.9%) used the nets over six (6) years and the lowest (22.9%) for a period of 3-4 years. This is an encouraging practice, however, consistence use of nets and integrations of other personal protection measures should be promoted in order to ensure full protection against mosquito bites. A study done by Shelly & Mwambwe (1998) in Zambia observed that all households interviewed had some basic awareness of bed nets as a technology for preventing bites and reducing the nuisance of mosquito during the sleep.
Plate 1: Traditional Somali house
An insight interview about the knowledge and experience with mosquito nets showed that teachers and others who had some formal education are among those who most often owned mosquito nets and understood their role in reducing malaria transmission. This is probably due to education advantage the group enjoys and channels used to promote health messages are mainly those that largely target the educated members of the community. Promoting the use of nets through channels that use the local languages will go a long way in addressing the discrepancy in net use and awareness.

Although majority of the residents reported to have very positive opinions concerning the desirability of mosquito nets, they complained of the cost of the nets, hotness when sleeping under a net and problem of proper air circulation inside the nets as a major disadvantage of the bed nets. In the focus group discussions communities were concerned about the safety of the chemicals used to treat the nets. While others said the chemical has “a bad smell”. The community also revealed that those nets that are dipped in chemicals have shorter lifespan as compared with the non-treated ones. Besides impregnated nets, other simple preventive measures including the application of permethrin or deltamethrin to clothing or the use of insect repellants such as DEET on exposed skin surfaces are also effective and not very expensive. DEET is also generally very safe. Therefore, in addition to promoting nets, households should also be given alternative ways of controlling malaria transmission. Discouraging settlement within breeding sites such as along the Tana River also reduces the chances of infection. In addition, many mosquitoes bite inside the houses, and the design and protection offered by the dwelling are important determinants of malaria risks. Wire mesh, screens, and other mosquito proofing measures are effective, but may be
expensive. In a nutshell, household members should be educated on the alternative measures so that they can make informed decisions.

It is important to note that the above disadvantage on bed nets as mentioned by the community can have an implication on malaria control programme. As mentioned by Hill (1991), insecticide treated nets are generally acknowledged to provide a high level of protection to users and to be more effective than any other measure currently being used. However, they have important cultural and economic implication for the communities concerned. This kind of work, therefore, becomes necessary at this moment. In order to create a climate of acceptability for the ITNs and other measures aimed at reducing transmission economic and cultural aspects and environmental aspects need to be addressed. For instance, people should be taught and informed on the safety of the chemical used. Communities should also be informed of other protective measures like environmental management as an option to their concern on hotness of the net.

In the Abuja Declaration, African governments committed themselves to reduce or eliminate the tariffs imposed on mosquito nets, netting materials and insecticides, in order to help lower retail prices. Consequently, the governments of seventeen countries in Africa, Kenya included, have taken action in accordance with the Abuja Declaration to reduce taxes and tariffs on nets and insecticides. However, this does not make nets readily available to all. For example, in this study, the nets costs ranged from 300-600 Kenya shillings depending on the size and the type of the nets. There is need in reduction of the prices for the common man to access the nets.
Development of more local industries and competition among them by ensuring private sector investment in manufacturing and importing mosquito nets will go along way in reducing the cost of nets. In Kenya few companies are involved in net ITNs such as Supanet. On chemical production, the Pyrethrum Board of Kenya produces larvicides and Pylarvix Tm 0.5 EC as a means of source reduction. Other products include Pymos Tm 0.6 EC (a water based spray), suitable for the young adults, and a residual spray known, as Pymos Tm 10% pyrethrines a space spray. Further government action in form of subsidies, or subsidy schemes, is needed to bring ITN prices down to a level affordable to the poorest families.

The local primary health care (PHC) office provides nets and residual sprays to the community to a subsiide prices, for example a treated net cost 250 Kenya shillings (US $3). However, the community said there was very limited choice in terms of net size shape, and colour in the office. The community preferred generally conical nets for ease of hanging (Fig. 8). They also preferred large, light-colored nets. The nets are not available all the time in PHC offices since the supplies from the government are not also consistent.

5.7 Times of the year household use bed nets

As mentioned by study, Netmark (2000) in Nigeria, nets were not used all year round or in all sleeping situations. Finding in this study is not exceptional either, with majority, (53.2%) stating that nets are used only during rainy session and not when members slept outdoors except for young children. Families in the study area sleep outdoors at least half (1/2) of the entire night for climatical reasons that make it inconvenience family member to sleep inside houses.
Contrary to Netmarks’ findings on vulnerability, in this study, result demonstrated that vulnerable groups were given priorities for sleeping under a net. Vulnerable groups mentioned included children under five years and pregnant women. The recognition of vulnerable groups by the community is a step in the right direction but is should be followed by action such as giving priority to children and pregnant women. Currently, the government provides nets to antenatal mothers attending maternal child health services. Extending the same to other vulnerable groups like children and the elderly may reduce the risk of malaria transmission. However, in the focus group discussions (Fig. 9), men complained that pregnant women do not like the nets, though some women disagreed. Others said that it was because of the hotness inside the net that they did not like. There is need to investigate this claim, at the same time alternative methods of controlling malaria should be availed under such circumstances.

Nets were reportedly washed from one week to every two months, typically with water and with soap and were hanged in the sun to dry. Respondent virtually did not understand how washing would affect treated nets. They further mentioned that the white nets that are common in the study area get dirt quickly. They community should be given clear instructions when purchasing nets.

The results of the study indicated that knowledge of treatment were moderate as majority (70.6%) do use treated bed nets. However as Kachur et al., (1999) mentioned, communities do not understand why nets should be retreated; and only 14.3% mentioned re-dipping as necessary. The communities should be educated on
how the nets would protect them against the mosquito bite and at the same time the need to use nets that are treated with chemicals.

In the Abuja Declaration (2000), government committed themselves to use different approaches in promoting the use of ITNs. Therefore this study points out a major problem with ITNs lack of mechanism that ensures they are retreated. Health authorities should ensure the necessary approaches to create demand and use of the nets. For instance, social marketing schemes, health education campaigns, and communal dipping sessions and generally “a net culture” will all play their part in improving community capacity in controlling malaria.

5.8 Communication pattern

As pointed out by the American association for the advancement of science (1991), the development of locally sustainable approach is critical in malarial control. This approach must be specifically tailored to the social and economic environment of different communities. To achieve this goal, the study identified the existing communication channels among the communities Vis-à-vis available health education channels.
The community generally preferred conical nets to rectangular nets because they are easy to hang.
Plate 3: A focus group discussion
The primary social unit of the Somali community is the immediate family (Qoys or Reer) consisting of a father, mother and children, unlike the nuclear family extending to the relatives of the spouses. The Somali political organizations are based on kinship. It is therefore imperative for malaria control programme managers to understand these social-cultural features of the Somali community. The study identified the existing communication channels and assessed potential channels for improving malaria prevention.

Building on these existing networks of communication and other variety of channels are key elements of community based health programmes success. Both traditional and contemporary social grouping are powerful venues for communicating new ideas as indicated by Abdallah (1982) and Irshat (1999). Kinship forms the basis of important daily interpersonal communication links among the Somalis. In addition, the Heer (law) are regulations formulated by the elders. Any innovation introduced in the communities' social system will be judged in relation to the social and cultural practice. The introduction of the youthful community health workers and the village health committees in these areas has failed in the past probably because of lack of recognition by the community.

As Shelley & mwambwe (1998) observed, diffusion of ideas in the rural communities often spreads along kinship lines as brothers exchange news and lend social and economic support to their respective household. Similarly, women in the study area revealed having sessions of small group composed of neighbors after household chorus almost on daily basis. Although men dismiss this meetings as “a gossipping”
session, women discuss important issues in their lives. This can be an important venue to relay health messages since male attends most of the community forums.

Radio listening pattern ranged from non-radio listeners to those who listen to Kenya Broadcasting Corporation. Over fifteen percent (15%) of radio listeners mentioned British Broadcasting Corporation Somali service as the station they use. This is because of the station broadcasting in the indigenous language. Currently, KBC, the local broadcasting station airs in the indigenous language only between 8.00 pm-9.00 pm from Monday to Friday. There are no specific sessions covering health programmes. Probably the indigenous language enjoying more airtime and incorporating health programme can improve awareness among the listeners.

5.9 Sleeping pattern

Households used raised beds, mattresses and sleeping mats. Family homestead in the study area includes several dwellings, the main house, a cooking place and often-additional structures for domestic animals and chickens. Household members sleep in the main house as well as additional domestic structures including small rectangular or roundhouse and open space within the compound. Sleeping arrangement is important in vector control. For instance, nets are usually hanged in the main house but, where there are other structures for sleeping as observed in the study area, household members are exposed to mosquito bites in the early evening hours before they retire to the main house. It is paramount that household use other vector control measures in order, to reduce the exposure to mosquitoes when not using nets.

Majority (71.8%) of the household members do not actually sleep outside their homestead but about 28.2% occasionally spends either in the neighbor or with
relatives. The finding of this study also agrees with Shelley & Mwambwe, (1998), that relates age, gender, and kin relationships determine where particular family member sleep. Although sleeping arrangement in the household is a sensitive topic, malaria programme planners need a baseline survey on how sleeping accommodation affects technologies such as curtains and nets use.

Mothers often sleep on the same mat with the breastfeeding infants and children under two years. To estimate the number of mosquito nets needed per family would depend on the type of family (whether nuclear or extended). In the study area, the average household size is eight persons. This will also depend on the number of sleeping structures used and the sleeping arrangement for children, youth and adults. Due to the harsh climate (hot), families indicated that using the main sleeping house occurred only after it got cold (towards midnight and the rest of the night). Family members also sleep in other structures in the homestead that have better ventilation or open space within the homestead (Fig. 10). An insight interview revealed that nets are often in the main house since household members felt inconvenienced using the nets in the early hours in the other structures and returning them when going to sleep in the main house later at night. This behaviour may undermine the efficacy of ITNs in protecting households against risk of malaria transmission. Where ITNs use is not popular, other alternative vector control methods like environmental management should be encouraged.
Plate 4: A main house and a smaller structure for sleeping in.

Household members use the small structure for sleeping in the early hours of the night because it is less hot as compared to the main house.
CHAPTER SIX

RECOMMENDATIONS AND SUGGESTIONS

6.1. Recommendations

Insights about community culture, knowledge, perception and household structure provides a practical guideline on health programme. Households are the cornerstone of preventive health measures and decision-making. Similarly, in-depth understanding of household economics, gender roles and social organization go a long way in achieving behavioral changes. This study puts forth the following recommendations:

Communities need to be empowered so that they have enough knowledge on malaria transmission and preventive measures. Although majority of the respondents believed that mosquitoes transmit malaria, some of respondents believed in other possible causes. This has implication on disease control. The ministry of health should actually create awareness through intensive training of community health workers, design Information, Education and Communication materials in the local language to improve people’s understanding of the disease.

Cash income is extremely limited among residents in Garrisa. Food and school fees are higher priorities than mosquito nets. Cost recovery programmers need to consider cash availability. There is therefore need for government and non-governmental organizations involved in malaria control to make the nets available. Where households cannot afford to pay cash for nets, the local primary health care office should allow contribution in kind for example, exchange of nets for livestock.
Malaria programmers should focus on improving social-economic status of community concerned. An integrated approach requires a comprehensive consideration of social, environmental and nutritional issues. Therefore, an intersectional approach involving many parties namely: Ministry of Health, Ministry of Information, Ministry of Social Services and Environment and Non-Governmental Organizations should all work and coordinate activities that will improve health and economic status of the community in general.

The findings in the study indicated that majority of the correspondent complained of hotness and inconvenience in the use of bed nets. Health planners should develop nets to which are specific to ecological and social conditions. Temperatures in Garissa range from $28^\circ C - 39^\circ C$. These coupled with high humidity discourages the use of nets. Dipping curtains and other materials could be an alternative. Other simple preventive measures including the application of permethrin to clothing or the use of insect repellants such as DEET on exposed surfaces are also effective and need not be prohibitively expensive. Therefore, an integrated method should be encouraged to reduce the population of mosquitoes.

Strengthening community organizations like the council of elders and community health workers would go along way in providing accessibility to antimalarials. For instance, community pharmacies should be revived and stocked with drugs and ITNs. The community pharmacist should also be able to provide household drugs and nets for sale on installment basis.

As finding of this study indicate community meetings and health centers are the preferred links in the community network. Using these existing networks of
Communication and venturing into other available channels are important in communicating malaria intervention. Women are also useful in disseminating information. Since they would share with fellow women in order to effectively manage fever and among children. Programme planners should also use school children to disseminate information. Other venues include community elders who are respected and their messages are therefore taken seriously.
6.2 Suggestions for future research

There is need for more research on community-based programmes as stated in the primary health care integration objectives in all projects. Community expects its socio-economic status to improve and therefore there is need to come up with an all round programme to address this expectation.

There is need to determine how much households/families spend on antimalarial drugs, insecticides, sprays, coils and other preventive methods, to find out cost effective methods in malaria control at household level.
REFERENCES


Kachur, S.P; phgilips-howard, P.A; odhacha, A.M; reubush, T.K; Oloo, A.J; & nahlen, B. L.; (1999) Maintenance and sustained use of insecticide-treated bed nets and curtains three years after controlled triualin western Kenya. Tropical Medicine and International Health.4, 728-350


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PPENDIX 1

Household interview guide

Knowledge, attitudes and behaviour about malaria control

1. Serial No. ________________________________

2. Sex: Male
   Female

3. Respondent:
   - Head of Household
   - Father of Household head
   - Son of Household head
   - Spouse of Household head
   - Mother of Household head
   - Others specify ________________________________

3. Marital Status:
   - Married
   - Single
   - Widow/Widower
   - Divorced
   - Others specify ________________________________

4. Respondent highest academic grade completed:
   83
5. Number of women of reproductive age (15 - 49):

6. What is the total number of children and adults who routinely sleep in the household?

   Children
   Adult
   Total

7. What are the main health problems or sickness that people in this community experience?

8. What are the common sickness of children and adult during the rainy season?

   Common sicknesses of children
   Common sickness of adult

10. What are the main causes of fevers in young children?

11. In your opinion what are the main causes of malaria?
12. Did any member of your family suffer from malaria in the last two weeks?

--------------------------------------------

Treatment

13. What are the different treatment methods people use in this community for malaria?

--------------------------------------------

14. Among all the different types of treatment and care that you have mentioned which are the most effective and which are least effective.

Most effective: __________________________________________________________

Least effective: __________________________________________________________

15. How do they work? ______________________________________________________

16. Among the different herbal medicine that people try which are the most effective (probe please). __________________________________________________________

17. Where do you go for treatment?

Chemist

Herbalist

Government Hospital

Private clinics

Others specify __________________________________________________________

18. Among the above places which one do you like least?

________________________________________________________

19. What do you do when malaria treatment fails in children?

85 __________
20. Apart from drugs and herbs what other forms of malaria care do people use?

21. Which of the following medicine do you buy when having malaria?

- Chloroquine
- Metakelfin
- Fansidar
- Panadol
- Aspirin

Others specify

22. What do you do to prevent malaria in your family?

Others specify

23. What strategy or methods do you rely upon to reduce mosquitoes around the place where you live?

Others specify
Household economic activities

24. What are your sources of income?

Household head

Household members

25. Do members of this household have livestock or other animals? Please estimate the number:

None
Cattle (1-5 stock)
Cattle (5 - 10 stock)
Cattle (>10 stocks)
Goats (1-5 stocks)
Goats (5 - 10 stock)
Goats (>10 stocks)
Donkeys
Chicken
Others specify

26. Where are the animals kept?

Cattle shed
In the house
Adjacent family houses
Others specify

27. What is the distance of the livestock shed from the family house?

87
28. Does the family have a farmland?
   Yes
   No

If yes, what is the produce used for?
   Primarily the family's own use
   The family's use and selling
   Selling only
   Other specify ________________________

29. What is the approximate monthly income from all the main economic activities?
   Farming Kshs _________
   Livestock Kshs _________
   Salaries/wages Kshs _________

30. Are there other persons residing outside this household that often support this family financially?
   Yes
   No
31. The following is a short list of items that families in this area sometime want. If you were to have money available, what would be the order of your preference: (Please rank e.g. 1,2,3---etc)

<table>
<thead>
<tr>
<th>Item</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td></td>
</tr>
<tr>
<td>School fees</td>
<td></td>
</tr>
<tr>
<td>Agricultural tool</td>
<td></td>
</tr>
<tr>
<td>Batteries</td>
<td></td>
</tr>
<tr>
<td>Mosquito nets</td>
<td></td>
</tr>
<tr>
<td>Bed</td>
<td></td>
</tr>
<tr>
<td>Sleeping mats/mattresses</td>
<td></td>
</tr>
<tr>
<td>Clothes</td>
<td></td>
</tr>
<tr>
<td>Medicine</td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Others specify</td>
<td></td>
</tr>
</tbody>
</table>

32. For how long have you used mosquito nets?

The following questions are for families that have ever used a mosquito net:

32. For how long have you used mosquito nets?
33. Which members of the family are using the net(s)  
   Father  
   Children  
   Mother  
   Visitors  
   Others specify  

34. How many bed nets are in your house that are currently in use?  

35. Did you experience any difficulties or problems with nets? List the problems (Please probe)  
   (i)  
   (ii)  
   (iii)  
   (iv)  

36. Were there any advantages?  

37. At what times of the year did you use the net?  
   All year round  
   Only during rains or when there are mosquitoes  
   Other specify  

38. Do you treat your nets? If yes, how often?  

39. If No, why?
40. Do you have a radio?
Yes  
No
If yes, which broadcasting station do you listen to? 

41. In what way do you prefer receiving health information that might be of some assistance to the family?
Community meetings
Small groups of neighbours
Through radio
At the health centre
Next of kin
Other specify 

Care of family members within households and sleeping patterns

42. Does anyone from the household ever sleep outside the house?
Yes
No

43. Does any member of the family have an infant under 2 years?
Yes
No

44. Do the children in this family use nets?
Yes
No
45. At what age does a child leave his/her mother and sleep alone?

46. At what times approximately do the adults and children retire for bed?
   Adults
   Children

47. How do you protect yourself from mosquito bites in the evening before you retire for the night?

48. If anyone goes to relieve himself during the night, does he/she leave the house?
   Yes
   No

49. If yes, is the door of the house during that time closed or left open?
   Closed
   Open
APPENDIX 2

Focus group discussion

1. What causes malaria?

2. How can you know if someone has malaria?

3. What causes malaria to be more severe / serious?

4. What group(s) of people are most affected?

5. If someone has convulsion and fever whom do you advise him/her to see? (Probe please)

6. What time of the day do you find mosquitoes active and biting?

7. Are malaria drugs easily available in the community?

8. Can you name anti-malarial drugs you use and their sources in this community?

9. Name some sources of malaria drugs used in the community?

10. How do you regard the effectiveness as well as the cost, of modern anti-malarial drugs as compared to herbal medicine?

11. In your opinion, are mosquito nets effective in malaria control?

12. In instance, where mosquito nets are few in family, who is/are given more preference than other family members to use the nets?

13. Do you encounter any problem in using mosquito nets?

14. What is your knowledge on Intermittent Preventive Treatment in the control of malaria for pregnant women?

15. What can be done to reduce the level of malaria in this community?
APPENDIX: 3
SAMPLE SIZE DETERMINATION

Sample size will be determined using the formula as used by Fisher et al, (1998).

\[ n = \frac{Z^2pqD}{d^2} \]

Where:

- \( n \) = Sample size
- \( Z \) = Standard normal deviate (1.96) which corresponds to 95% confidence interval.
- \( P \) = Proportion of the target population estimated to have a particular characteristic
- \( q \) = \( 1 - P \)
- \( d \) = Degree of accuracy
- \( D \) = Design effect = 1

Thus,

\[ n = \frac{1.96^2 \times 0.3 \times 0.7}{0.05^2} \]

\[ = 322 \]

\[ \approx 340 \]

The sample size has been rounded to 340 so as to cover respondents who may decline to participate in the study during the actual period of data collection.