

Malaria Prevalence and Treatment Seeking Behavior in East Gezira Locality – Sudan (2008)

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1. INTRODUCTION

Malaria as a health problem:

Malaria remains one of the most pressing health problems in the world with an estimated 300-500 million cases annually of which 90% occur in Africa (1). In Africa it is estimated that 40% of fevers are due to malaria. (2). It the leading infectious cause of childhood worldwide and claims the lives of 1.5 – 2.7 millions persons each year, and there is no vaccine to prevent malaria, thus the disease continues to be a major international health problem despite usage of treatment through different protocols and guidelines. Sudan contributes most of the malaria cases in the WHO Eastern Mediterranean Region(3.). Endemicity ranges from holo-endemicity in the South, hypo-endemicity in the North and epidemic-prone in Central Sudan [4-5].

The main vector is *Anopheles arabiensis* and dominant parasite is *Plasmodium falciparum* which is more than 90% followed by *Plasmodium vivax*, which is now increasing especially in the eastern parts of Sudan. The situation is further aggravated by the spread of chloroquine resistant *P. falciparum*, increasing insecticide resistance of vectors and inaccessibility of many areas, particularly in the South.

Based on health facility data, malaria represents 15-20% of all deaths occurring in the country as well as 25-40% of total outpatient attendances and 20-32 of admissions (3, 4).

Rationale of the study:

In spite of the efforts going on by control programs to reduce malaria morbidity and mortality, still there is an increase in malaria cases all over the world.

Malaria control is better to be based on local analyses of the problem; shouldn't only focus on ecology and epidemiology but include community knowledge and perception, treatment seeking behavior and the cost of the disease.

The sensitivity in communicating malaria prevention, treatment, and control measures just as health treatment-seeking behavior can be influenced by a variety of factors, including local beliefs about disease, access, costs, and attitudes toward health-care providers (both Western and traditional healers).

There is a need to recognize the prevalence of Malaria in east Gezira locality, and culture of people in seeking treatment, so the study can answer the question of what proportion of true malaria cases get appropriate treatment with effective antimalarial drugs, and to identify the best strategies to improve the situation. Interventions for the private and public sector need to be developed and evaluated. More information is needed on the specific drugs used, considering resistance pattern in a particular area. In order to guide future policy development, we should define the nature of self-treatment, record multiple treatments and attempt to identify the proportions of all cases who begun treatment with antimalarials at standardized time intervals.

2. OBJECTIVES OF THE STUDY

General objectives: -

To calculate the prevalence of Malaria in East-Gezira locality and to study its treatment seeking behaviour.

Specific objectives: -

- 1) To calculate the prevalence of malaria in east Gezira locality in Sudan.
- 2) To investigate people perceptions regarding malaria and its causes.
- 3) To identify personal behavior in seeking treatment for malaria.
- 4) To describe traditional practices in use by patients with malaria/fever.

Malaria as a disease:

Malaria is a serious, sometimes fatal, disease caused by a parasite. There are four species of malaria that can infect humans: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae* (7,10, 11).

Malaria is a mosquito-borne disease that causes over 2.7 million deaths per year according to estimates by the World Health Organization(1,2,3)..

It is a potentially fatal blood disease caused by a parasite that is transmitted to human and animal hosts by the *Anopheles* mosquito. The human parasite, *Plasmodium falciparum*, is dangerous not only because it digests the red blood cell's hemoglobin, but also because it changes the adhesive properties of the cell it inhabits. This change in turn causes the cell to stick to the walls of blood vessels. It becomes especially dangerous when the infected blood cells stick to the capillaries in the brain, obstructing blood flow, a condition called cerebral malaria. Scientists using the x-ray microscope are hoping to learn more about how the parasite infects and disrupts the blood cells and the blood vessels of an infected host. The life cycle of the malaria parasite in a human or animal begins when an infected mosquito transmits malaria sporozoites to a new host. The sporozoites travel to the liver, where they invade hepatocytes (liver cells) and multiply thousands of times over the following two weeks before rupturing out of the liver into the blood stream. During the first 48 hours after infecting a red blood cell, a parasite goes through several phases of development. The first phase is the ring stage, in which the parasite begins to metabolize hemoglobin. The next phase is the trophozoite stage, during which the parasite metabolizes most of the hemoglobin, gets larger, and prepares to reproduce more parasites. Finally, the parasite divides asexually to form a multinucleated schizont. At the end of the cycle, the red blood cell bursts open and the parasites are dispersed to infect more red blood cells (8).

Signs and symptoms of malaria:

Symptoms of malaria include fever and flu-like illness, including shaking chills, headache, muscle aches, and tiredness. Nausea, vomiting, and diarrhea may also occur. Malaria may cause anemia and jaundice (yellow coloring of the skin and eyes) because of the loss of red blood cells. Infection with one type of malaria, *Plasmodium falciparum*, if not promptly treated, may cause kidney failure, seizures, mental confusion, coma, and death (7).

Incubation period:

For most people, symptoms begin ten days to four weeks after infection, although a person may feel ill as early as eight days or up to one year later. Two kinds of malaria, *P. vivax* and *P. ovale*, can relapse; some parasites can rest in the liver for several months up to four years after a person is bitten by an infected mosquito. When these parasites come out of hibernation and begin invading red blood cells, the person will become sick (7,11,14).

Malaria diagnosis:

Essentials of Diagnosis:

- History of exposure in a malaria-endemic area.
- Periodic attacks of sequential chills, fever, and sweating.
- Headache, myalgia, splenomegaly; anemia, leukopenia.
- Characteristic parasites in erythrocytes, identified in thick or thin blood films.

- Complications of falciparum malaria: Cerebral findings (mental disturbances, neurologic signs, convulsions), hemolytic anemia, hyperpyrexia, dysenteric or Cholera-like stools, dark urine, anuria (9, 10).

People at risk:

Persons living in and travelers to, any area of the world where malaria is endemic may become infected (10, 11, 12).

Management:

Malaria can be cured with drugs. The type of drugs and length of treatment depend on which kind of malaria is diagnosed, where the patient was infected, the age of the patient, and how severely ill the patient was at start of treatment (9, 10).

Choice of regimen is based on: -

- Local cost and availability of antimalarial drugs.
- Area of malaria acquisition (i.e. drug resistance pattern of *P. falciparum*).
- Prior chemoprophylaxis.
- Known allergies.
- Concomitant illnesses other than malaria.
- Age and pregnancy.
- Likely patient compliance with therapy.
- Risk of re-exposure to malaria after treatment (9).

New guidelines were suggested for the management of simple malaria; the shift to artemisinin-based combination therapy (ACTs) in Sudan, the issue of treatment-seeking was considered as the cost of drugs is clearly higher compared to the cost of chloroquine, but seems to be better and has a good results in malaria treatment, since it is free of charge in health centers of Sudan FMOH. Effective management of malaria in children under the age of 5 requires mothers to seek, obtain, and use medication appropriately (17). This is linked to timely decision, accessibility, correct use of the drugs and follow-up (17).

Severe malaria:

(Where patients have coma, jaundice, renal failure, hypoglycemia, acidosis, severe anemia, high parasite count, hyperpyrexia) is ideally treated in an intensive care or high dependency unit where patients can be monitored closely both clinically and biochemically. Intravenous quinine is the treatment of choice but rapid injection can lead to hypotension, dysrhythmias and death (7, 10).

Perceptions about malaria

Malaria was mentioned as a major health problem. However, it was clear that malaria had no specific name in the commonest languages used in some countries in Africa. In Uganda malaria was called omushwija or omussuja which means 'fever' or omushwija/ omussuja gwa malaria which means 'fever due to malaria'. Another name suggested was omushwija/omussuja ogwensiri ('fever due to mosquitoes')(11); in Sudan they call it Om barid (fever with cold), Alghibbia (come and goes), Alwirda Altiltea (every 72 hours) and Wad-Alwirda for the spleen. Causation and transmission of malaria were not distinguished and were used interchangeably. Causes of malaria mentioned were drinking of dirty/ un-boiled water, breathing in bad air, staying near somebody with malaria, supernatural forces, e.g. witchcraft, avenging spirits, eating fresh maize or sweet fruit such as mangoes, pineapples and passion fruits(7). Less frequently mentioned as causes of malaria were staying in cold weather, acquired immunodeficiency syndrome (AIDS) and immunizations against polio (8, 11).

Even most of those who said that malaria is caused/ transmitted by mosquitoes had an explanatory model that differed from the biomedical one. Most people in focal group discussions believed that malaria is transmitted by drinking mosquito eggs or larvae in dirty water, only a few said that malaria is transmitted through the bite of mosquitoes. Signs and symptoms of malaria that were well articulated included fever, headache, vomiting, diarrhea, tiredness, sweating, convulsions, paleness, weight loss and dehydration (11).

Malaria is a major health problem in many countries of Africa with a different perceptions about causes of the disease; most of them said it is the mosquitoes, but not all of them agreed because they link this fact with those who have a malaria in a dry season when there is a very few mosquitoes, or the people who have not cached the disease even in the season of

malaria, hence a time of mosquito or even those who get it in spite of sleeping under the mosquito nets. Some of linked malaria with dirty or contaminated water, non sterile or non boiled water, bad air when sitting near some body with malaria. Many of them linked it with supernatural forces or spirits or eating some fruits like mangoes and pineapples. Also cold weather was mentioned in many times as a cause of malaria and some said it has a relation with AIDS or immunization against polio virus (16). Even those who linked malaria with mosquitoes mention different aspects; drinking mosquitos' eggs and larvae in dirty water is the cause of the disease and only few of them mentioned mosquitoes bite as a cause of malaria (22).

Beliefs about severity and complications:

Many symptoms like fever, headache, general fatigue and vomiting as symptoms and signs of simple malaria which are recognized in many countries and some times cured or treated at home(18). Anaemia, splenomegaly and convulsions are also linked to malaria and might cause abortion as understood by the participants in some countries. Some ethnic groups perceived more liable to malaria like some tribes who migrates from the mountains which is cold and hypoendemic areas. The most symptoms that linked to supernatural nature is convulsions which used to be treated by traditional healers with splenomegaly, they believed that hospitals can not treat these types of the disease, and some times hospitals are the main cause of the disease and they bring the traditional healer inside the hospital or some time try with the care givers in the health units to discharge the patient, or even taking him forcefully if the hospital authorities refused to discharge him. In order to deal with the disease quickly, the care givers must recognize when a family member becomes ill. Some care givers mentioned irritability, diminished activities in children and/or decreased appetite and some times increased thirst is mentioned in small proportion of mothers. Fever is defined as indicator of illness, when started or worsen throughout the day, which is considered serious when high or accompanied with other signs such as diarrhea, vomiting or cough. Also fast breathing, grunting, extreme weakness and lethargy, as well as twitching and convulsions are also considered as a dangerous sign (18).

3. MORBIDITY AND HEALTH-SEEKING BEHAVIOR FOR MALARIA

The most frequent disease that mentioned was malaria, sources of health care for patients with malaria mentioned included public health institutions, private practitioners, traditional healers and self-treatment(18). It was brought up that modern medicine is superior to traditional medicine for simple malaria. However, it was pointed out that malaria is now becoming difficult to treat unlike in the past as the following quote illustrates. 'In those days when one got malaria only one injection of chloroquine was enough...,and within a matter of hours one was well, but now you have to take more strong medicines like fansidar or quinine for days and it is even difficult to get cured and the malaria becomes chronic'. it was said that traditional healers have effective medicines for treating malaria. For some complications like convulsions or splenomegaly traditional therapies are believed to be particularly effective (if not more effective than biomedical care).Self-treatment for malaria was very common. Sources of self-medication included drugs from retail outlets, market places, shops, drug shops and from health workers in public health units. Use of left-over drugs of previous treatments and sometimes sharing of treatment among family members was also practiced. Injections were a very popular means of treatment, said to be faster in action and more efficacious than tablets. Itinerant injectionists were said to be common especially in rural areas. In almost all self-treatment was said to be cheap and convenient(14). Numerous problems were mentioned that would deter people with malaria from attending public health institutions for treatment: long waiting time, lack of drugs, user charges, corruption and bribes by health workers, health workers abusing patients, not being examined in the laboratory, and being given tablets instead of the preferred injections. Private practitioners were perceived to be caring but expensive. (14-15)

Patterns of care:

Treatment for fever:

Effective management of malaria in children under the age of 5 requires mothers to seek, obtain, and use medication appropriately. This is linked to timely decision, accessibility, correct use of the drugs and follow-up.

Fever is something that warrants attention. At the same time fever is extremely common and is not immediately considered serious. Typically the initial response to fever is to treat at home and monitor the people's condition. Home treatments include both traditional and modern remedies. Common home treatments are :(16-17)

- 1- Sponging/bathing with tepid to cold water to lower fever. This has been encouraged in the health centers and widely adopted by mothers.
- 2- Commercial anti-pyretics such as panadol, cafinol or aspirin are given at home.
- 3- Chloroquine and now fansidar usually left over from a prior illness is given at home.

Taking the child to the health center is not uncommon, especially when the health center is fairly close, children are taken to the facility whether or not the episode is perceived as serious. Although typically something is done for the child at home as initial response, it appears that generally such treatment does not replace or unduly delay going to the health center. However, because initial treatment abate the symptoms, they may in some cases prolong the home monitoring period and delay seeking care from a health facility(16-17-18).

Decision whether or not to take child to the health unit:

It is difficult to develop a clinical definition of malaria in the absence of laboratory confirmation because of a wide variety of symptoms that may occur, so in some countries e.g. Zimbabwe, no set of symptoms were better in predicting a positive blood slide than the unspecified criteria used by village health workers(18) ; some authors noted that people know when they have malaria or that knowledge of symptoms was high (18), but in some countries like Sri Lanka less than half of malaria patients in hospitals thought they had malaria(19). In studying treatment seeking behavior for malaria, it is important to identify local disease categories or illness terms corresponding to malaria; in many cultures there is no general term or illness concept that approximates malaria, hence any symptoms like malaria can be subsumed under general term malaria. The current WHO strategy for the control of malaria aims at the prevention and reduction of morbidity and mortality through early diagnosis with prompt an effective treatment (2). In order for this strategy to succeed, it is important to understand the current patterns of malaria treatment in the community. The pattern of malaria treatment depends on whether malaria is recognized as a distinct disease as well as knowledge on symptoms of malaria and transmission through mosquito bites (19, 20).

There are a number of key factors that bear on whether or not the care giver will decide to take the patient to the health center for care: Equitable improvement of treatment-seeking for malaria will depend partly on how different socio-economic groups perceive the ease of accessing and utilizing malaria treatment services from different healthcare providers. Hence, it was important to investigate the link between socioeconomic status (SES) with differences in perceptions of ease of accessing and receiving treatment as well as with actual health seeking for treatment of malaria from different providers. Whether or not patient's condition is continuing or worsening; if a child does not respond to initial treatment, or develop additional or more serious symptoms, it is likely that s/he will be taken to the health unit. A mild episode which appears to self-resolve within 24 – 48 hours, and these cases are less likely to be seen at health unit. If the illness comes and goes, it means it is not serious so you just treat at home(18-19, 20). Seeking treatment for malaria is strongly determined by the distance of health services. Availability of drugs was the second overall most important reason for seeking care from various providers. People look for satisfaction through a good quality of health services in the health facilities including laboratory and medical prescription(20).

Availability of drugs:

It is clear that a major reason for care giver to go to obtain drugs. We go to the clinic so that we can be given medicines. If a care giver knows that the clinic is out of drugs, she will probably decide not to go there for treatment. From the community that had the lowest proportion of children taken to the health center for care... when we reach there we are always told that there are no medicines so we just stay at home and wait for fate(22, 23,24,25)..

Perceived quality of provider:

Care givers believed that providers have a medical expertise and know appropriate treatment for their children. The fact that providers have undergone training, know how to conduct an exam, and can dispense drugs appears to be the primary bases for this confidence. At the same time the level of satisfaction with specific health units varies(23, 25).. pharmacies used to serve as a patent medicine dealers (vendors) were the most perceived easily accessible providers for medicines, followed by private hospitals/clinics into communities with full complement of healthcare providers are the major determinant of self medications. There were inequities in perception of accessibility and use of different providers. Poverty can lead also to inequity in treatment-seeking for malaria since it can prevent some people from seeking complete medical and laboratory services. (24)

Distance from the health center:

Children who live closer to the health center are more likely to be taken there for treatment than are children who live far away. The illness narratives indicate that 79% of children living within 1 hour's traveling time were taken for treatment at the health center, compared with 58% of children who resided more than an hour from the health center. Distance also affects decisions whether to return when illness persists: about 16% of those who live near and 3% of those who live far took the child into the health center for a follow-up visit due to continued symptoms. Most often travel is by foot, and occasionally by bicycle (in some countries in the literature the care taker was a male and they use a bicycle for traveling). In response to the question as to why she decided not to seek care at the clinic, one mother said: It is far. That is why sometimes we feel lazy. We take about 2 hours on foot. Sometimes the mothers themselves are sick or pregnant and unable to make the trip: During the time the child was sick, I was also sick. The other thing is that it is very far to the health center. Unless I had a bicycle, I could not have taken her there. Some mentioned the long waits for service as a discouraging factor: I hate standing on long queues for hours. You arrive as soon as they open the clinic, but you can still be there even after lunch. I thought of trying treatments at home since I had an idea what was wrong with her(23-26)..

Cost:

A study of the cost of malaria at the house hold level, community perceptions, preventive measures and illness behavior linked to the disease was undertaken in five villages in dry zone of Sri-Lanka; the surveyed community has a high knowledge of malaria, although side effects of antimalarial drugs were often confused with symptoms of the disease. The community sought prompt diagnosis and treatment at western-type facilities, with 84% making use of government facilities as their first choice and 16% preferring private facilities. The preventive measures used were burning coils and special leaves and 93% of families had their houses sprayed with insecticides. Average direct expenditure on a single malaria episode was \$3 U.S, with some families spending more than 10% of the annual household net income per episode. The highest expenditure was on especial diet for the sick person, to neutralize the perceived heating effect of the disease and its treatment (21).

It appears that fees can discourage caregivers from seeking help at a clinic. Since only one clinic in the sample charged fees, we cannot make a conclusion about the effect of cost. However, the lowest proportion of cases treated at a clinic came within this catchment's area, as well as from the catchment's area of a clinic that had no drugs. Caregivers in this catchment's area most frequently cited lack of money as a reason for not taking the child to the clinic: I have got no money. They do not attend to our children when we don't have money and they send us away(25, 27). There was some evidence of socio-economic differentials with regards to the providers where treatment was first sought, although some of the directions of inequity were not uniform. For instance, while the least poor SES respondents used home treatment more than the most poor. However, the most poor SES used more of traditional medicines and least of private hospitals and clinics (21).

Other factors:

Lack of child care for other children left at home was rarely mentioned. Need for permission to go to the health center is not an obstacle; mothers appear to make autonomous decisions regarding treatment needed for their ill children. They infrequently report consulting with other family members, and none reported being prevented by other family members from acting on their treatment decisions(15).

A high score of mothers' knowledge and recognition of fever/malaria was recorded. Mothers usually start care at home and, within an average of three days, they shift to health workers if there was no response. The main health-seeking behaviour is to consult the nearest health facility or health personnel together with using traditional medicine or herbs. There are also health workers who visit patients at home. The majority of mothers with febrile children reported taking drugs before visiting a health facility. The choice between the available options determined by the availability of health facilities, user fees, satisfaction with services, difficulty to reach the facilities and believe in traditional medicine(15).

Combination of factors:

Usually a combination of the above factors enters the decision calculus, as the following quotes show. I didn't go to the clinic because most of the time they say they have no drugs. When they have, they usually only give 1-2 tablets and you just take it at the clinic. They never give you something to carry home. So they don't give enough. And those people at the clinic never really examine our children. They just write what we tell them. If you ask questions, they just shout at you. Well, if it is a nice person who attends to you, if you go back because the child's condition is not improving, s/he will

change the medication or let you see the doctor. Whereas others will shout at you that you are not giving the child the medicine properly and give you the same medicine again (19, 20,27).

Household responses to malaria and their costs:

A study of the cost of malaria at the house hold level, community perceptions, preventive measures and illness behavior linked to the disease was undertaken in five villages in dry zone of Sri-Lanka; the surveyed community has a high knowledge of malaria, although side effects of antimalarial drugs were often confused with symptoms of the disease. The community sought prompt diagnosis and treatment at western-type facilities, with 84% making use of government facilities as their first choice and 16% preferring private facilities. The preventive measures used were burning coils and special leaves and 93% of families had their houses sprayed with insecticides. Average direct expenditure on a single malaria episode was \$3 U.S, with some families spending more than 10% of the annual household net income per episode. The highest expenditure was on especial diet for the sick person, to neutralize the perceived heating effect of the disease and its treatment (24,27)

Child malaria treatment practices among mothers:

A study of 883 mothers with children aged 0-9 years was undertaken in Kilifi district on the Kenyan coast in order to examine child malaria treatment practices. Quantitative and qualitative methods were used to investigate; whether complications of childhood malaria were recognized; decision making dynamics in treatment seeking behavior; and the extent and reason of the use of proprietary treatment. Childhood malaria was perceived as a mild, every day illness, not preventable but treatable. The link between malaria and mosquitoes was not recognized. Mothers recognized convulsions, anemia, and splenomegaly but did not link them to malaria. Antimalarial drugs were not given or were withdrawn from children suffering from these conditions. Ill children were treated promptly by purchase of over-the-counter drugs at retail outlets (22).

Care takers` perceptions of clinical manifestations of childhood malaria:

A cross-sectional household survey was carried out in Kibaha district in Tanzania ; a total of 1530 caretakers were interviewed, 620 (40.5%) reporting malaria attacks among their children in the last three months of which 70% reported that the attack were severe. Only 15.7% of those reporting severe attacks could mention convulsions as symptom of severe malaria, while fever and vomiting were mentioned as symptoms of severe malaria by 93.3%. higher level of education was significantly associated with knowledge of symptoms of severe malaria, also with promptness in taking management action. The fact that most care-takers reported fever and vomiting as symptoms of severe malaria, and hence the observed high proportion of reported severe malaria, implied that community under study do not perceive febrile convulsion as being a symptom of severe malaria (23).

The use of official health sector and other treatment modalities:

The choice of treatment may be influenced by a number of factors including access, cost, attitudes towards providers and beliefs about the disease (24). Multiple resorts are often used depending on whether malaria and its complications are perceived as being amenable to treatment by modern or traditional methods (25) .Use for modern medicines is generally high for non severe malaria (26) but not for severe malaria (27).There was a large range of variation in treatment-seeking patterns, with use of the official sector ranging from 10% to 99%, and resort to self-purchase of drugs ranging from 4% to 87%. Treatment modalities can be separated into three different categories (19, 22, 26):

- 1) Home or self-treatment, including both herbal/traditional treatment and Pharmaceutical /antibiotic use.
- 2) Traditional techniques.
- 3) The official allopathic or "Western" medical sector, including hospitals, clinics, dispensaries, private practitioners, and village health workers. Individuals often use a combination of self-treatment, traditional medicines, and more than one clinic or health-care provider, what is known as a "hierarchy of resort (23,24,26). When people employ a hierarchy of resort in seeking treatment for malaria, home treatment usually serves as the first line of defense (25).

Home treatment:

Practices, decisions and actions that occur at home that influence treatment of malaria and potential malaria illnesses, which in practice means non-complicated fevers in the under five year olds. Most malaria episodes are treated outside the formal health sector. Inappropriate use of over-the-counter drugs at home is a serious problem due to inadequate quality and inappropriate dosages.

Malaria patients are treated at home although both medical services and those of traditional healers are used to prevent and treat symptoms of what we and sometimes even the patients know to be malaria. A multi-country study found that "self-treatment in Africa, especially in rural areas were about 75% of the population, is the rule rather than the exception (25, 26).

Cost and convenience are obvious reasons for home treatment, especially in countries where "structural adjustment policies" are in place; yet perceptions also play a significant role (22,23). In terms of a hierarchy of resort, it is the perception of the great majority of people in countries throughout the world that most illnesses should first be treated at home, and only when such treatment fails and the illness persists, or worsens, should other types of therapies be sought(37). If it is perceived that health workers treat most patients rudely, that they do not have the appropriate drugs, or that the general quality of their services is inadequate, this will also influence a first preference for home treatment. Home treatment may, of course, result in incorrect or incomplete regimens or dosages, and it may also cause delays in taking a severely sick person to a health facility in a timely fashion (20).

Although a range of anti-malarias is available in the market, the fact that many of those who "self-treat" purchase their medicaments from poorly-informed shopkeepers and drug sellers is a significant reason for concern about misinformation on appropriate treatment. Throughout the world people may store tablets and use them when they become ill and this behavior will indeed lead to drug resistance (24, 26). Home Based Management of Fever (HBMF) is the process by which clinical cases of fever in the under fives can be recognised and treated at home by their care givers, sometimes assisted by community health workers or medicine distributors. Where malaria is highly endemic, HBMF offers antimalarial treatment to young children with fever. As children can very rapidly develop severe malaria, which carries a high mortality risk, prompt effective treatment is crucial.

For many years, the cornerstone of malaria control across Africa has been early detection, diagnosis and treatment through primary health care services. However, numerous studies have shown that many cases of malaria are not brought to the formal health sector for treatment, that antimalarial drugs are widely available in the marketplace and that children are often treated at home with over-the-counter medication bought from shops. Home treatment with shop-bought drugs is thought to be so common that it is recognised as a valuable means of malaria control, provided that steps are taken to ensure quality. It has been proposed that fast-acting drugs be made widely available to parents for home treatment, and that communities and families become knowledgeable in giving prompt and effective treatment. It is vital that drugs are pre-packaged, rather than loose pills, as adherence to the correct dosage is then more likely. Ideally, if there are two different antimalarial drugs to be administered as combination therapy, the two drugs should be coformulated into single tablets.

As most young children dying from malaria do so within 24 hours to 3 days of onset of severe symptoms the speed with which malaria is diagnosed and treated is critical in reducing mortality. By minimising the delay before treatment, effective treatment with antimalarials at home can save many lives. Home treatment also circumvents any inadequacies in the formal health care system. In formulating mechanisms that promote effective home treatment, it is vital to understand the factors that influence treatment-seeking behaviour, and whether or not a family self-treats with antimalarial drugs. Malaria home care practices generally are highly variable in different situations and there is limited programme experience to influence good practice. Working in an unregulated (private) market and with informal health providers of variable educational background needs carefully tested and monitored strategies. Drug quality, consistency in distribution and levels of drug resistance vary from place to place, and need to be taken into account. There may be a need to coordinate with existing home or community treatment programmes, not just for malaria but for other infectious diseases as well.

Malaria home care can reduce the burden of disease, morbidity and mortality in under-five year olds, improve partnerships in public and private sectors and broaden community involvement in malaria control.

Home based management of fever/malaria has been shown to have an impact in reducing malaria burden. It is essential to make efficacious drugs of good quality consistently available pre-packaged and ideally in coformulated tablets. In each environment it is important to identify possible partners and promote local ownership of the programme. Two key elements are communication and education for recognition of symptoms and appropriate response and training of community health workers and the service providers to support them; Investment in adequate supervision and monitoring is essential.

Self-treatment was common. Reasons stated include: their ability to recognize malaria, the cost of travel and, on some occasion, the lack of health care facilities. Sometimes parents seek advice from other community members, if they agreed that the sickness is malaria they administer antimalarial drugs. People obtain drugs, commonly chloroquine, aspirin and paracetamol from private pharmacies or drug stores in nearby villages or cities. Dosage is decided based on people's experience. People usually start with self-treatment and then they look for treatment in nearby facilities (25).

Traditional Methods:

Utilization of traditional medicine is widespread in non-industrialised countries. The efficacy of many traditional treatments have been well documented, including in the area of skin disorders and allied fields, malaria and other parasitic disorders. Currently, modern pharmaceuticals are not available in constant supply in those areas most affected by malaria - particularly in sub-Saharan Africa and in South and SE Asia. At present, the cheapest drugs for the treatment of malaria are becoming ineffective as malaria parasites evolve mechanisms to resist them. Alternative drugs are often too expensive for the poor to afford, so in some areas the use of herbal remedies is popular. The two most effective drugs for malaria originate from plants: quinine from bark of the Peruvian *cinchona* tree, and artemisinin from the Chinese antipyretic *Artemisia annua*. It is probable that other plants contain as yet undiscovered antimalarial substances. Much research has focussed on trying to isolate and purify these from plants. However, there has been almost no research in the clinical effectiveness of herbal remedies as they are used in real life. National malaria control programmes have largely ignored the potential of traditional healers, even though they are more numerous and culturally accepted than conventional health care workers. Furthermore, resistance to major drugs for treating bacterial and parasitic diseases has significantly reduced treatment options. Finally, the cost of drugs, if available and effective, is so high that institutions and patients are increasingly unable to afford them. Reports from clinics and NGO's in Africa, where 80% of the world's malaria burden exists, indicate that the poorer members of society are now using traditional medicine at least for economic reasons.

The reviewed studies indicated that traditional healers were not considered important in the treatment of malaria, sometimes because they did not claim to cure it or because the people already knew how to treat malaria with traditional or modern medicines. Traditional malaria medication is based on the use of substances such as pepper, salty water, and bitter fruits, roots, and leaves and barks of certain trees. Most of these substances are ground into powder and boiled in water, to be taken as a drink, or added to food. The effectiveness of these substances is, of course, highly questionable. Nonetheless, a number of other traditional antimalarial therapies have been found to have active ingredients effective against malaria (25). The preferred and actual practices related to treatment of fever in children have different aspects; the main treatment options available for any patient in the area: consulting health workers, traditional medicine, use of herbs and self-treatment. People interviewed showed that, although it was not mandatory, people when getting ill think about consulting health workers at the health facilities or at health workers home or if the patient couldn't move they ask the health worker to visit him at home. During rainy season, one of the patient's relatives visits the health worker at home and describes the patient symptoms and accordingly the drug is given to this relative for the patient (25).

Study design:

This is a community based cross-sectional study, which was carried out during the period from September to December 2007 in East-Gezira locality in Gezira state.

Study area:

The study was conducted in East- Gezira locality, Gezira state, central region of Sudan. The locality is 146 km south to Khartoum state. The capital of the locality is Rufaa town and there are other three small towns and about 134 villages. Population of the locality were about 149,000 ,most of them live within their own houses and there are few nomads. The majority have piped water supply, but very few of them depend on stored rain water (*Hafeer*). In the locality, the medical services are provided by governmental institutions e.g. Rufaa teaching hospital, eight rural hospitals, 25 health centers and 42 dispensaries in addition to NGOs and private clinics (personal communication).

Study population:

All people of East-Gezira locality (134 villages).

Target population:

Households with at least one attack of malaria during the last three months prior the survey were targeted by the study. Study subjects were selected according to the following inclusion and exclusion criteria:

Inclusion criteria:

1. Households in East- Gezira locality villages (134 villages).
2. Malaria at least one time during the last three months prior the survey.

Exclusion criteria:

1. Households who came to the area very recently (less than three months).
2. Those that haven't any experience of getting malaria before time of the study.

Sample size:

The minimum required sample size for population survey was calculated using EPI INFO version 6 (formula: $n = Z^2 \frac{pQ}{d^2}$) to be 206 according to the following settings:

- 1) Confidence interval $(1-\alpha) = 95\%$.
- 2) Population size = 149000
- 3) Expected frequency of 5%.
- 4) Worst acceptable result = 2%
($Z = 1.96, d = 0.05, p = 5\%$ and $Q = 95\%$ and n is the sample size).

For the design effect of two the sample size was 410.

Sampling procedure:

Five villages (convenient sample) were selected randomly from all villages in the study area. From the families living in these villages, 410 families were selected. The number of families in each village was according to the population (probability proportional to size) e.g. if the population of these five villages is 15000, then the percentage we choose from each village is $410/15000 \times 100\%$ which about 2.8% or 28 for every 1000 persons.

Flow chart:

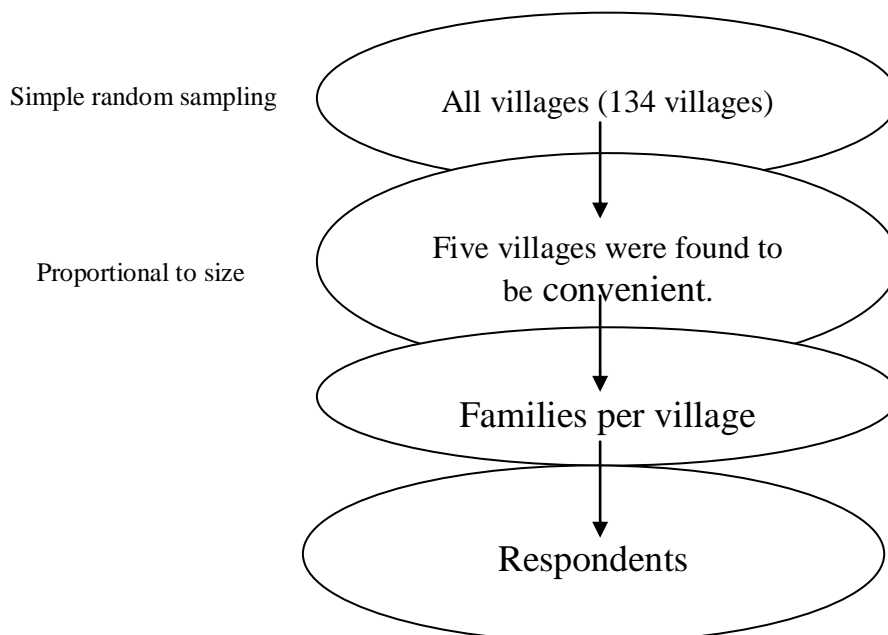


Fig.1: the flow of sampling procedure, a study of malaria prevalence & treatment seeking behavior, east Gezira locality 2007.

4. DATA COLLECTION

- Data about treatment seeking behaviour was collected using structured questionnaire.
- The questionnaire has been filled by the researcher and volunteers using direct interviews with the head of the family.
- Blood samples were collected by the trained lab technicians from all children three to nine years of age who found at home at the time of data collection.

5. DATA ANALYSIS

Data was analyzed using computer software which is the Statistical Package for Social Science (SPSS). tables or figures were drawn where appropriate.

Table 1: Age distribution of the study population, East-Gezira locality, Gezira state 2007.

Age	Frequency	Percent
Less than 20	20	4.9
20 -30	201	49.1
31-40	153	37.4
More than40	35	8.6
Total	409	100.0

Table 2: Respondents occupation, East-Gezira locality, 2007.

Work	Frequency	Percent
Housewife	361	88.3
worker	28	6.8
Employee	14	3.4
student	6	1.5
Total	409	100.0

Table 3: Families' monthly income, East Gezira locality, 2007

Monthly income(SDG)	Frequency	Percent
Less than 100	96	23.5
101- 200	66	16.1
201-300	202	49.4
301 – 400	16	3.9
400 and above	29	7.1
Total	409	100.0

Table 4: Care takers educational levels, east Gezira locality - 2007

Level of education	Frequency	Percent
Illiterate	70	17.1
Primary	243	59.4
Secondary	88	21.5
Graduated	8	2.0
Total	409	100.0

Table 5: Blood films results from children aging from 3-9 years old, East Gezira locality in 2007

Test	Frequency	Percent
positive	36	7.7
negative	427	91.4
Total	467	100

Table 6: A table reflecting the presence of gametocytes of the blood samples taken, East-Gezira locality 2007.

Presence of gametocytes	Frequency	Percent
Yes	4	11.1
No	32	88.9
Total	36	100

Table7: Symptoms by which they think they have Malaria, east-Gezira locality 2007

Supposed symptom	Frequency	Percent
fever	63	15.4
headache	26	6.4
fatigue	47	11.5
Vomiting	14	3.4
Fever+headache+fatigue	7	1.7
Fever+vomitting	24	5.9
Fever+headache+vomiting	38	9.3
Fever+headache+fatigue+vomiting	7	1.7
Fever+fatigue	4	1.0
Total	409	100.0

Table 8: Malaria; households last previous episode, east Gezira locality - 2007

Last previous episode of malaria	Frequency	Percent
During one week	57	13.9
During one month	61	14.9
During two months	87	21.3
During three months	16	3.9
More than three months	188	46.0
Total	409	100.0

Table 9: Perceived causes of Malaria, in east Gezira locality 2007

Perceived causes of malaria	frequency	percent
Mosquitoes	362	88.5
Contaminated water	7	1.7
Cold	35	8.6
Cold & mosquitoes	2	0.5
Mosquitoes & contaminated water	3	0.7
total	409	100.0

Table 10: time of people going to the health units for treatment of malaria, East Gezira locality 2007

When do you go to the health unit or hospital?	Frequency	Percent
Once feel symptoms	368	90.0
After 24 hours of symptoms	9	2.2
When get money	20	4.9
After home treatment	3	.7
When get convulsions	2	.5
After 24 hrs., home treatment or convulsions	1	.2
Not answer	6	1.5
Total	409	100.0

Table 11: A table describing people attitudes about malaria, east Gezira locality 2007

If worry about Malaria	Frequency	Percent
yes	403	98.5
No	6	1.5
Total	409	100.0

Table 12: Causes of worry about Malaria, east Gezira locality 2007

Why worry about Malaria	Frequency	Percent
Dangerous	80	19.5
Communicable	218	53.3
Difficult to treat	94	23.0
others	17	4.1
Total	409	100.0

Table 13: Time at which caretakers go to the health units or hospital in east-Gezira locality 2007

Time of going to the health unit	Frequency	Percent
Once feeling symptoms	368	90.0
After 24 hours of feeling symptoms	9	2.2
When got money	20	4.9
After home treatment	3	.7
With convulsions	2	.5
All of the above	1	.2
No answer	6	1.5
Total	409	100.0

Table 14: Cause of delay in seeking treatment, East-Gezira locality 2007

Cause of delay in seeking treatment	Frequency	Percent
Not so dangerous	380	92.9
Traditional treatment is enough	17	4.2
Official treatment is expensive	5	1.2
I have a lot of work to do	1	0.2
Poor communications of the cadre	3	0.7
All of the above	3	0.7
Total	409	100.0

Table 15: Place from which people get treatment since they didn't go to the health units in east-Gezira locality 2007

Origins of Drugs	Frequency	Percent
Private pharmacy	291	71.1
Health facilities	115	28.1
Others	3	0.7
Total	409	100.0

Table 16: Percentage of care takers who use home treatment for Malaria in east-Gezira locality 2007

Using Home Treatment	Frequency	Percent
Yes	12	2.9
no	397	97.1
Total	409	100.0

Table 17: The idea about drugs treatment in people of east Gezira locality 2007

Drugs Treatment	Frequency	Percent
Not Useful	2	.5
Partially Treat Malaria	82	20.0
Should Taken With Another Method	3	.7
Some Are Better Than Others	90	22.0
Can Fully Treat Malaria	230	56.2
Not Useful, Treat It Partially & Some Are Better Than Others	2	.5
Total	409	100.0

Table 18: Percentage of households who change their food habits when get Malaria in east-Gezira locality 2007

Change of food habit	Frequency	Percent
yes	386	94.4
no	23	5.6
Total	409	100.0

Table 19: A table describing the food changes done by families when one of the family members get Malaria in east Gezira locality 2007.

Food changes	Frequency	Percent
Increase juices intake	19	52.8
Stop taking Lemon	10	27.8
others	4	11
Especial meals	3	8.4
Total	36	100.0

Table 20: A place of seeking treatment for the last Malaria Episode if one of family members has Malaria in east-Gezira locality 2007

Place of seeking treatment for malaria	Frequency	Percent
Home	4	1.0
Traditional healer	1	.2
Treatment with out doctor	5	1.2
Go to health units	397	97.1
All the above	2	.5
Total	409	100.0

Table 21: Wrong practices and behaviors in seeking treatment for malaria mentioned by the participants, in East-Gezira locality 2007

Other wrong practices	Frequency	Percent
Delay in taking treatment	122	29.8
Take treatment without consulting doctor	167	40.8
Neglecting follow up	59	14.4
Delay or stop it	51	12.4
others	10	2.4
Total	409	100.0

Table 22: Places where patients seeking treatment in relation to results of BFFM, East Gezira locality 2007

Result of BFFM	Treated at home	Treated at health facilities	Total
Positive	2	34	36
Negative	7	364	371
Total	9	398	407

$\chi^2 = 8.933$ P = 0.09

Table 23 Places where patients seeking treatment in relation people level of education, East-Gezira locality, 2007

Level of education	Treated at home	Treated at health units	Total
Illiterate and primary	7	144	151
Secondary - university	9	247	256
total	16	391	407

$\chi^2 = 21.156$ P = 0.02

Table 24: Places where patients seeking treatment in relation people monthly income, East-Gezira locality, 2007

Monthly income	Treated at home	Treated at health units	total
100 – 300	9	188	197
301 – 400 and above	1	209	210
Total	10	397	407

$\chi^2 = 9.288$ P = 0.03

6. PREVALENCE OF MALARIA

The prevalence of malaria among 467 children aging between 3 – 9 years in EG locality was found to be 7.7%. This prevalence seems to be high compared to the average of the Gezira state which is 1.3% according to the survey carried out at the same time by the state (personal communication). When compared with the survey done in the same locality it was found to be 3% which also lower than that of this study. In the Gezira state the prevalence was 1.3% in 2007 and 2.01% in 2008, these results are so good since the national programme facing many problems, but still the locality of east Gezira has a prevalence more than that of the whole state which might be due to the lack of health services or the nature of this place. According to this study, the above result can be linked to the cultural aspects of the people; especially in using different types of treatment apart of the formal one, with the combination of multiple factors mentioned in the results (18). Also there are some environmental factors like sugar cane in Algenaid area may cause stagnation of water, the suitable breeding area for mosquitoes. In the five villages 17.1% are illiterate, a factor that has a very great influence in the way or method of dealing with all diseases like malaria. The relation between methods of treatment and prevalence is not so clear (P value = 0.09).

Perceived causes of Malaria:

Not all people in East-Gezira locality knew exactly what the cause of malaria is; 47 persons mentioned different causes. Although most of the mothers related this to mosquito bites, some did not. Most of the mothers failed to associate this condition with malaria, believing it is caused by evil spirits. Many of them mentioned a different things they can cause malaria as they suppose. Still there are 8.6% thinking that malaria is caused by cold weather, seven percent were linking the cause of malaria with the combination of mosquitoes and contaminated water, while five percent refer it to the cold. The wrong perceptions about malaria definition and causes might be due to culture or the nature of the extended families. In some countries like Philippines or some parts in Africa the perceived causes of malaria are mosquitoes, polluted water, food contaminated with flies or sudden changes in the weather(9). The season of the disease is autumn or after autumn and this is why they link it with water and water related factors or weather (9, 13).

Perceived symptoms and signs:

A care giver must know when one of the families becomes ill; by recognizing symptoms, signs and complications of malaria so as to take a right action in the best time (13, 14). Families have been asked about how they could diagnose simple and severe malaria and when did they go to the health units. some respiratory symptoms like cough, shortness of breathing and chest pain was mentioned by some respondents as symptoms of malaria, while many of them remembered GIT symptoms like abdominal pain, vomiting, diarrhea and loss of appetite. Malaria as perceived can be presented by any features other than usual, like blurring of vision, rigor, hallucinations or any other psychological or personality changes (14).

There is a big difference between people in diagnosing their illness as malaria; most of them said that fever and headache are the most pressing sign and symptom that make them go to health unit, and some of them noted general fatigue for them to diagnose Malaria, while fever alone was mentioned as enough symptom to diagnose malaria. Three things like fever, headache and vomiting mentioned together by few people, and the rest mentioned a combination of fever, headache and general fatigue. About one percent mentioned other symptoms such as arthralgia, yellowish urine, nausea and abdominal pain which all can be found when examined patients at the clinics.

Most of the participants; about 403 worried about getting the disease. Because it can prevent them from work. And 19.5% think it is a dangerous disease and can kill due to previous experiences with the same cases, 53.3% of the participants said it is a communicable disease which can be transmitted from one to another member of the family and it is difficult to treat. Still there are 2% of them mentioned that they don't worry about Malaria because it is not a dangerous disease; many times they got malaria and fully treated using different types of treatment one of them is the official one.

The best time at which the patient should be taken to the health unit is the time of feeling early symptoms such as fever and headache or nausea (7). In this study 90% of the participants mentioned that they go to the health unit or hospital once they feel symptoms and signs, but 4.9% of them prefer it when they have money, and 2.2% said that they go after 24 hours and after they make sure this thing is dangerous or even some times after trying home treatment and its effect and waiting till they have convulsions or other severe symptoms. Number of factors affects the decision of when to take patient to the health units for care; e.g. whether or not, if a child respond to treatment or develop another or more dangerous symptoms (17). The other factor is if the illness comes and go and availability of drugs or medicines (17). The

perceived quality of health service provider also has an important role in directing patient to the health units or to the home or traditional methods; the level of satisfaction varies also from one center to another (25). Inequities exist in how different the populations perceive the levels of ease of accessibility and utilization of different providers for malaria treatment (20). The differentials in perceptions of ease of access and use as well as health seeking for different malaria treatment providers among SES groups could be decreased by reducing barriers such as the cost of treatment by making health services accessible, available and at reduced cost for all groups (20).

Causes of delay in seeking treatment:

Most of them 380 (92.9%) think firstly; this is not dangerous disease and stay in their homes till they make sure it is like that or get convulsions and others prefer traditional methods of treatment, 5 persons said that the treatment in the official institutes is very expensive so they follow the above method. 3 people of the participants refers the cause of delay to the poor communication or bad approach from doctors and health workers in the governmental health clinics, centers and hospitals and 1 man prefer to go after finishing they work and the rest mentioned all the above factors as a cause of delaying coming to the health units. Two major points mentioned affecting health-seeking behaviour. When the child condition deteriorated, with 'high fever, inability to stand or walk, refusal to feed, loss of consciousness, yellowish sclera, severe diarrhoea and repeated vomiting', there is an urgent need for health worker consultation. On the other hand, any condition what so ever its severity if started at any time at night the child has to wait till the morning. Other reasons include: low coverage and/or performance of health facilities, the expected cost and frequent use of traditional medicine and herbs. Seeking help from health personnel and not from other options has no relation to the parent's or child's age or gender. Multi cultural factors might cause delay in seeking treatment for the patient condition; some times the distance from the health centers, so people who are living closer to the health centers are more likely to be taken for treatment than those who are living far away, and the long wait is a discouraging factor (21, 26). Cost prevents care givers from seeking help at a clinic especially for poor person (22, 24). Some families' mothers need a permission to go to request management for the ill person (12, 29). There was association between family income and way of seeking treatment (P value = 0.02).

About drugs treatment:

Mothers usually start care at home and after some days they shift to health workers if there was no response (21, 22). The main health-seeking behaviour is to consult the nearest health facility or health personnel together with using traditional medicine or herbs. There are also health workers who visit patients at home. The majority of mothers with febrile children reported taking drugs before visiting a health facility. The choice between the available options determined by the availability of health facilities, user fees, satisfaction with services, difficulty to reach the facilities and believe in traditional medicine. (21)

Early diagnosis and adequate treatment are the basic elements of any effective malaria control programme and should be seen as fundamental rights of all populations affected by malaria (25). However, so many malaria cases are treated outside the official health units with drugs bought from shops, markets or pharmacies especially in uncomplicated malaria, less educated or poor patients. 56.2% of our families in the collected data suppose that drugs used for malaria can fully treat it, 82 (20%) of them said it can treat it partially, 22% find some drugs like fansidar are better and tolerable and easy to use (single dose) than others like chloroquine (CQ) or quinine but 0.7% of the households think that all drugs are not useful and should be taken with another method of treatment like traditional one. Mothers usually go through different treatment option before consulting health facilities ending with obvious delay in seeking care (23). As early effective treatment is the main theme of the control programme, implementation of malaria home management strategy is urgently needed to improve the ongoing practice (16).

Home treatment:

The practice of self medications can be of advantage to avoid delay between the onset of the disease and effective treatment and can be linked with a lower risk of death. Actual use pattern should be described to inject corrective measures; not only to improve management at home but also to decrease the misuse of anti-malarial drugs so avoiding the emergence of drug resistance malaria. Home treatment and self medications are common and our results reflect the situation that is probably prevalent all over the African continent (21, 23).

A small number (about 3%) of the participants prefer to deal with their condition at home whatever it is, they change food habits to avoid bad complications they think; hence they avoid lemon juice which can interfere with the action of CQ, so

5.6% of them have a food habit changes during malaria episode, 19% of them drink *aradeb* or increase juices and sugar intake, and other 3% have a special meal or nutritional system. Still home treatment is remaining one of the most common treatment even in well educated person to avoid effort of going to governmental health units which is consuming time, money and spirits(24,27).

2.9% of the participants treated the last Malaria episode at their homes using drugs treatment or other method, while some go to traditional healer who use skin cautery for malaria as they do for jaundice (known practice at that area).

Types of home treatment by using some drinks like *Aradeb* and taking home drugs treatment like taking AS with Fansidar at home which not advisable to do even it is the first line of treatment now, so it is preferable to take it after being examined and investigated at health units, also there are 167 families using Artemether or Quinine and still CQ (chloroquine) at home, and 6 families was not taking any thing as they mentioned; a practice that may lead to severe malaria (7).

A place from where people get their treatment is different from 'one having malaria to another; most of them can easy buy it from the pharmacy which absolutely wrong practice, while the remaining participants can take it from the hospital, but some may buy it from the shop and still there are other practices which about 0.5% find it at home, may be they are remaining drugs of another persons who are not completed their therapy. Taking drug treatment using jungle methods as mentioned above carry a big risk, of using thing with out prescription of doctors who know which drug can give for simple or severe malaria or for which type of plasmodium malaria after proper history, examinations and reliable laboratory investigations, to avoid recurrence or drugs resistance malaria (7); the most stressing problem in the villages at the area of study, not so different from many other places (26, 27).

Traditional treatments:

Due to different cultures and factors surrounding people like socioeconomic status and inaccessibility of health services, in the majority of cases the mother is the most important one who can prepare and administer these methods. In other places also there is a high percentage of people who practice traditional treatment (27, 28). Consultation of traditional healers could be more frequent in severe cases. In many different countries like Tanzania and Mali, they defined illness characterized by fever and convulsions and called by local names and was believed in traditional treatment (28, 29, 30).

12 families use traditional methods in the treatment of malaria, and this is may be because of illiteracy, cost of official treatment, believes and culture which prefer traditional methods or even the very poor communication of health workers in hospitals and other formal units (15, 22, 31, 32). Education can affect the type of treatment that used by families in this study (P value = 0.03).

7. CONCLUSION

This study was conducted in east-Gezira locality to calculate the prevalence of malaria which was more than that of the state due to many differences between the locality and other six localities in Gezira state.

- Time of seeking treatment for the disease differ from one family to another; some of them go to health unit or take action once feel Malaria, some after home treatment, some wait until the condition become severe and even those who wait until they get enough money, but most of them are worry when one of them get Malaria.
- Shops and private pharmacies used to sell anti malarial drugs like *fansidar* and some other drugs easily even not required by a doctor, and so many patient uses this method for treating their conditions. Still they think drugs are not useful or it will treat the disease partially and this is why they use them with another method of treatment e.g. traditional or home treatment.
- There are so many other wrong practices like taking treatment without seeing a doctor, stop taking treatment abruptly or neglecting follow up are all of clinical importance; so they may cause drug resistance, recurrent or severe Malaria.

RECOMMENDATIONS

1. An effort should be done to decrease the prevalence of malaria in east-Gezira locality, since in showed higher prevalence than the whole state.

2. Behavioral changes programmes through health education, and this can be done by the doctors in Hospitals. Health centers and basic health units by health providers and this should include all dimensions of the malaria treatment and control programs. Behavioral changes should also focus on wrong habits and practices to be avoided like home treatments even those including antimalarial drugs treatments at home, and we should not forget the traditional methods like drinking some juices or cauterizing their skin by a traditional healers which cause an effective delay in seeking proper treatment.
3. Promote the status of the households in the community and their decision making power in seeking treatment for the ill patients who is taking care of by giving opportunities in education, income generating activities and employment.
4. Official health services like hospitals, health centers and basic health units should generate an attractive programs to encourage people to come to for ideal standard care according to the secondary health care protocol, in which a full history, examinations and necessary and proper investigations should be done first before any therapeutic intervention to avoid empirical or jungle use of drugs.
5. Free treatment for all malaria laboratory positive cases; a program which is already begun by Federal ministry of health in Sudan should be encouraged and maintained by the government and NGOs because one of the biggest causes in delaying treatment is poverty or lack of money.
6. They should avoid traditional healers, pharmacies, shops or markets that sell antimalarial drugs to be used with out a doctor consultation or laboratory investigations.
7. Increase the number of training courses for medical personnel to involve more medical assistants, and doctors and recruitment for more specialists and other cadres.
8. More studies are required to be done in this multicultural area to explore more problems; it is a part of Gezira state which is the most famous endemic area of malaria.

REFERENCES

- [1] WHO.Malaria.Twelfth programme report of the UNDP/World Bank/WHO special programme for research and training in Tropical diseases. Tropical diseases research: progress1985-94: Highlights 1993-94. World Health Organization. Geneva 1995: 57-76.
- [2] World Health Organization- regional office for the eastern Mediterranean, WHO country office in Sudan; WHO collaboration program. Internet communication on 22 September 2007.[http:// www.emro.who.int/sudan](http://www.emro.who.int/sudan).
- [3] Malik E.M., RBM, Sudan. Can malaria effectively be controlled in Sudan; March 2002. Internet communication on 23 September 2003.
- [4] Tarimo DS, Minjas JN, Bygbjerg IC. Malaria diagnoses and treatment under the strategy of the Integrated Management of Childhood Illness (IMCI) *Ann Trop Med Parasitol*; a5: 437 -44. 2001.
- [5] Robert S. Goldsmith. McGraw-Hill; Advisor of the McGraw-Hill's company. Current medical diagnosis and treatment(CD ROM) 2001 chapter 35 (infectious diseases).
- [6] Davidson 's , Priciples and practice of medicine, a text book of Doctors and medical students. Ed. 18.
- [7] Malik EM. Malaria control programme in Khartoum state. The effect of decentralization,on planning, organization,financing, community participation and control activities 1997.
- [8] Comoro, C, S.E.D. Nsimba BC. M. Warsame c, G. Tomson. Local understanding, perceptions and reported practice mothers/guardians and health workers on childhood malaria in a Tanzanian district* implications for malaria control. *Acta Tropica* 87 (2003) 305_ 313
- [9] Holly AW, Caroline O.H. Jonesb A critical review of behavioral issues related to malaria control in sub-Saharan Africa:what contributions have social scientists made? *Social science & Medicine* 59 (2004) 501 – 523
- [10] Flemming K, PH. Amerasingheb, Devika Pererac, Wim Van der Hoeka, Felix P. Amerasinghed A village treatment center for malaria: community responce in Sri Lanka. *Social science & Medicine* 50 (2000) 879 -889.

- [11] Denise N,G Dorsey², David Guwatudde¹, Kate Kigonya¹, Bryan Greenhouse³, Stephen Musisi¹ and Moses R. Kanya¹ Urban malaria: primary caregivers' knowledge, attitudes, practices and predictors of malaria incidence in a cohort of Ugandan children, *Tropical Medicine & International Health* volume 8 no. 8 pp685 – 692 august 2003.
- [12] Kilian¹ A. H. D., D. Tindyebwa², T. Gu' lck¹, W. Byamukama³, T. Rubaale², G. Kabagambe³ and R. Korte¹ GTZ Gesellschaft fu'r Technische Zusammenarbeit GmbH, Dept. Health, Education, Social Security, Eschborn, Germany Attitude of women in western Uganda towards pre-packed, unit-dosed malaria treatment for children. *Trop. Med. & Int. Health* vol. 8 No 5pp 431 – 438.
- [13] arimo¹ .S.G.K. Lwihula², J.N. Minjas¹ and I.C. Bygbjerg. Mothers' perceptions and knowledge on childhood malaria inthe holendemic Kibaha district,Tanzania: implications formalaria control and the IMCI strategy. *Trop. Med. and Int. Health* vol. 5 no 3 pp 179–184 march 2000
- [14] Thera. AM. Child malaria treatment practices among in the district of Unfolila, Sikasso region, Mali. *Trop. Med. And International Health*, vol: 5, no 12 pp 876-881 December 2000.
- [15] Charles A. M. de Bartolome and Stephen A. Vosti Choosing between public and private health-care: A case study of malaria treatment in Brazil. Available online 22 December 1999
- [16] Cynthia A. Miguel, Lenore Manderson & Mary Ann Lansang Patterns of treatment for malaria in Tayabas, The Philippines: Implications for control. *Tropical Medicine and International Health* Volume 3 Issue 5 Page 413 - May 1998 doi:10.1046/j.1365-3156.1998.00249.x
- [17] Fred N. peoples perceptin of Malaria in Mbarara, Uganda. *Tropical Medicine and international Health*, volume 7 NO 5 pp 462 – 470 May 2002.
- [18] Flemming K, Priyanie H. Amerasingheb, Devika Pererac, Wim Van der Hoeka*, Felix P. Amerasinghed. A village treatment center for malaria: community response. in Sri Lanka. *Social Science & Medicine* 50 (2000) 879±889.
- [19] Geisslera P,W, Nokesb K. R.J. Princeb, R. Achieng' Odhiamboc, J. Aagaard- Hansena, J.H. Oumad. Children and medicines: self-treatment of common illnesses among Luo schoolchildren in western Kenya. *B Social Science & Medicine* 50 (2000) 1771±1783
- [20] Sia^n E. Clarke¹, 2, Jane Rowley³, Claus Bøgh¹, Gijs E. L. Walraven³ and Steven W.Lindsay^{1,4}Home treatment of 'malaria' in children in rural Gambia is uncommon. *Tropical Medicine and International Health*. volume 8 no 10 pp 884–894 october 2003
- [21] Wilson Were Roll Back Malaria Department, World Health Organization, Geneva. Bringing malaria management closer to the home. Supportin Agency– Roll back malaria WHO.
- [22] Malik E. M. Treatment-seeking behaviour for malaria in children under five years of age: implication for home management in rural areas with high seasonal transmission in Sudan. *Malaria Journal*. Volume 5.
- [23] Espinoa F. E. Lenore M. Treatment seeking for malaria in Morong, Bataan, The Philippines. *Social Science & Medicine* 50 (2000) 1309±1316
- [24] Olaf M. U. Iler¹, Corneille Traore², Heiko Becher¹ and Bocar Kouyate, 'Malaria morbidity, treatment-seeking behaviour, and mortality in a cohort of young children in rural Burkina Faso. *Tropical Medicine and International Health* volume 8 no 4 pp 290–296 april 2003.
- [25] Tanner M. and Vlassov C. Treatment seeking behaviour for malaria: a typology based on endemicity and gender. *Soc. Sci. Med.* Vol. 46, Nos 4-5, pp. 523-532, 1998 © 1997 Elsevier Science Ltd. All rights reserved PII: S0277-9536(97)00195-0 Printed in Great Britain.
- [26] Mahamadou A. T, Umberto D'Alessandro²,M. T3, Adama Ouedraogo⁴, Julienne Packou⁵, Ould Ahmed Deida Souleymane⁶, Moussa Fané⁷, Gabriel Ade⁸, Fernanda Alvez² and Ogobara Doumbo. Child malaria treatment practices among mothers in the district of Yanfolila, Sikasso region, Mali. *Tropical Medicine and International Health* volume 5 no 12 pp 876–881 december 2000.
- [27] Shunmay Y^{1,2,3} and Nicholas J. White. How do patients use antimalarial drugs? A review of the evidence. *Tropical Medicine and International Health* volume 10 no 2 pp 121–138 february 2005.