University of Khartoum

Graduate college

Medical and Health studies Board

Study of Malaria among pregnant women admitted to Sinnar Teaching Hospital : Proportion and risk factors

BY

Fagr Ali Elzain Madani

(B.Sc In P & E H - University of Khartoum 1995)

A thesis submitted in partial fulfillment for the requirements of master degree

MPEH in public health

Supervisor:

Dr: Abdelsafi Abbas Gabbad

MBBS - MD

U .of . K

2011

الأيـــــــة

بسم الله الرحمن الرحيم

قال تعالى : (وَقَالَ رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ وَأَدْخِلْنِي بِرَحْمَتِكَ فِي عِبَادِكَ الصَّالِحِينَ).

سورة النمل الاية (19)

Table Of Contents

Acknowledgement

I would like to express my great gratitude and appreciation to my supervisor assoc professor Dr. AbdElsafi Abaas Head of department of epidemiology –Faculty of public and environmental health for guidance supervision, assistance and encouragement.

Dedication

To my husband , sons, mother, father, and brother .

Abbreviation

- RBM : Roll back malaria .
- NMCP : National malaria control programme .
- CSB : Central sanitary board.
- METC : Malaria Eradication training center.
- GDP : Gross Domestic product.
- UM : Uncomplicated Malaria.
- RDT : Rapid diagnosis test .
- ICT : Immune chromate graphic test.
- IRS : In door residual spraying.
- ITNS : Insecticide treated nets.
- IPT : Intermittent preventive treatment.
- NGOs : National governmental organizations .
- LBW : low birth weight.
- WHO : World health organization .
- SPSS : Statistical Package for the social Science

Abstract

Background:

Malaria during pregnancy is a major public health problem in tropical regions throughout the world. It can have adverse effects on both mothers and fetus, including maternal anemia , fetal loss, premature delivery, intrauterine growth retardation and delivery of low birth- weight infants (<2500g or <5.5 pounds).

The aim of the study was to investigate proportion of malaria and possible factors associated with malaria among pregnant women from may^{the}1 to June^{the}1 2009 .This was a descriptive cross sectional study conducted at Sinnar Teaching Hospital .

Materials and Methods :

A hundred and forty-five pregnant women attending Sinnar Teaching Hospital were included by total coverage during study period. Data were collected by a pre tested questionnaire and laboratory investigation for thick and thin blood films. Data were analyzed using Statistical Package for the Social Science (SPSS). The different variables were checked using chi-square and $p<0.05$ was considered significant.

Results:

The proportion of malaria among pregnant women was 15.9% with 95.9% of malaria cases due to falciparum specie infection. There was a significant statistical association between occupation (workers), education (illiterate), family income(less than SD 300) and malaria positivity (P=0.0001) , (P=0.025) and (P=0.04) respectively.

The results revealed a statistical association between awareness of pregnant women towards the disease and infection (p=0.001). The low

infection was among pregnant women who used insecticide treated nets (4.1%) compared to those who did not use them (21.3%), and low infection was among those who used intermittent preventive treatment (9.25%) compared to those who did not use (21.3%).

There was a significant statistical association between screening windows and doors and low rate of infection (P=0.0001). Additionally, there was a statistical association between accumulation of water near the houses, indoor and malaria infection (P =0.0001).

Conclusion:

Malaria proportion was high among illiterate women, low income families and working women. Screening windows and doors proved to be effective.

We recommend preventive measures by using insecticide treated nets, introduction of chemoprophylaxis policy and health education to raise pregnant women awareness about malaria.

المستخلص

خلفية :-

يعتبر مرض الملاريا اثناء الحمل من اكثر مشاكل الصحة العامه في المناطق المداريه في جميع انحاء العالم . الاصابة بمرض الملاريا وسط الحوامل له مضاعفات علي الامهات والاجنة تشمل الخسائر الجنينية و تأخر النمو وولادة الاطفال بوزن اقل من الطبيعي (2500جم).الدراسة وصفية تحليلية أجريت بمستشفى سنار التعليمي هدفت لدراسة نسبة الملاريا والعوامل المحتملة والتي لها علاقة بالملاريا من 1 مايو الى 1 يونيو2009.

منهجية الدراسة :-

تم أخذ عينة من 145 من النساء الحوامل المترددات على مستشفى سنار التعليمي بتغطية شاملة خلال فترة الدراسة . تم جمع البيانات عن طريق استبيان معد ومختبر من قبل والفحص المعملي لعينات الدم (سميكة ورقيقة) . تم تحليل البيانات باستخدام برنامج الحزم الاحصائية للعلوم الإجتماعية ولمعرفة العلاقة بين المتغيرات تم استخدام اختبار مربع كاي وتعتبر العلاقة ذات دلالة إحصائة إذا كانت القيمة الإحتمالية اقل من 0.05.

النتائج:-

بينت نتائج الدراسة بأن نسبة الإصابة بالملاريا وسط النساء الحوامل المترددات 15.9% . 95.7% من الحالات إصابة بالبلازموديوم فالسبرم .

أظهرت النتائج إنه توجد علاقة ذات دلالة إحصائية بين المهنة ، مستوى التعليم ، دخل الأسرة والإصابة بالملاريا القيم الإحتمالية (0.0001) , (0.025) ، (0.04) على التوالي .

كما أظهرت النتائج بأنه توجد علاقة إحصائية بين معرفة النساء الحوامل بمرض الملاريا ،كات الاصابه منخفضة وسط النساء الحوامل اللائ يستخدمن الناموسيات المشبعه (4.1%) مقارنة بالائ لا يستخدمن الناموسيات (21.3%) وكذلك كانت الاصابه منخفضة وسط اللائ يستخدمن ادوية الوقايه (9.25%) مقارنة باللائ لا يستخدمن ادوية الوقايه (21.3%) . كما اظهرت

النتائج بانه توجد علاقه ذات دلاله احصائيه بين تغطية الشبابيك والابواب بالنمالي وسط النساء الحوامل والإصابة بالملاريا القيمة الإحتمالية (0.0001) .

كما أظهرت النتائج بأنه توجد علاقة ذات دلالة إحصائية بين تراكم المياه قرب وداخل المنازل والاصابة بالملاريا(القيم الإحتمالية لهما 0.0001).

الخلاصة:-

توجد علاقة ذات دلالة إحصائية بين المهنة ، مستوى التعليم ، دخل الأسرة ، المعرفة بالملاريا وسط النساء الحوامل ، إستخدام الناموسيات ، أدوية الوقاية والاصابه بالملاريا

اقترحت الدراسة توفير وسائل وقائية باستخدام الناموسيات المشبعة ،إدخال سياسة الوقاية الكيميائية وسط النساء الحوامل و التثقيف الصحي لزيادة المعرفة بالملاريا .

List of tables

1.1 Introduction

Half of the world's population is at risk of malaria and an estimated 247 million cases led to nearly 881 000 deaths in 2006 (WHO, 2008). The Malaria is a disease caused by the parasite plasmodium and transmitted by the vector anopheles mosquitoes Malaria is water related disease . (Park,2005).

Malaria remains one of the worst of global health problem. This is due to partly to the widespread economic underdevelopment and to the emergence of species of mosquito resistant both to pesticides and to the drugs that prevent and treat the disease .However, in certain communities, a variety of cultural beliefs and practices are also part of the problem (Herberm, 1993).

As of 2005, 107 countries have reported areas at risk of malaria transmission. 3.2 billion People are still at risk present estimates are that around 350 – 500 million clinic disease occur annually.

Around 60% of the cases of clinical malaria and over 80% of the deaths occur in Africa south of the Sahara. of the more than I million Africa who die from malaria each year , most are children under 5 years of age , malaria also contributes significantly to anemia in children and pregnant women, adverse birth outcomes such as spontaneous abortion, still birth weight, and over all child mortality.

The disease is estimated to be responsible for an estimated average annual reduction of 1 – 3% in economic growth for those countries with the highest burden (WHO, 2005). Roll back malaria (RBM)program first focused in Africa aimed at:-

- Upgrading health delivery system at both the local and national levels in malarias countries.

- Intensifying use of bed netting (net coated with insecticides)called long lasting bed net, to prevent biting by malaria carrying mosquitoes.
- Mapping of malaria regions and of medical facilities to better direct health resources.
- Developing new drugs for victims a I ready effected by malaria.
- Coordinating the development and testing of new malaria drugs and vaccines.
- Developing methods to address malaria in emergencies (e.g. refugees and post war situations).

In all over the Sudan, the problem of malaria disease is recently increasing and it is difficult to see a situation where malaria dose not occur (WHO,2005).

Number of cases in Sudan 7 million per year, and number of deaths is 50000 per year, and the loss of days working 22% form days working in Sudan**.**

National malaria policy is:-

- Treatment and diagnosis of cases.
- Vector control.
- Insecticide – treated mosquito's nets.
- Epidemic preparedness. (NMCP, 2006).

Malaria is the major health problem in Sudan. The burden of disease is very high, it accounts for about 21%of all disease seen at outpatient department in health facilities in the country, ranging from 14%to 25% for in –patient admission, malaria accounts for 32%of all cases. An estimated figure of 2-7.5 million cases of the disease occurs annually. In term of mortality malaria accounts 20% of all hospital deaths with an estimated annual figure of about 35000 (Sidg,2003).

This study shall be guiding us to measure the malaria proportion among pregnant women and to relate malaria to socio economic factors, environmental factors and preventive measures such as insecticide treated nets and intermittent preventive treatment.

1.2 Justification

Sinnar has been selected because it is a seasonal hyper transmission and endemic area, accordingly to the stratification of national malaria control programme (SMOH, 2006).

Malaria is a major public health problem in Sinnar town. It is responsible for 9415 of cases and 1987 of hospital admission and 26 deaths annually (SMOH, 2006). Malaria infection during pregnancy is an enormous public health problem with substantial risks for the mother, her fetus and neonate .Mortality due to malaria is estimated to be over 1 million deaths each year (WHO, 2005) Pregnancy increases the risk of malaria in women. Malaria during pregnancy may cause intrauterine death of the fetus; it may also cause abortion (park, 2005).

1.3 Objectives

-General Objectives:

To study theproportion of Malaria among pregnant women attending to Sinnar teaching hospital.

- Specific Objectives:

1- To Estimate the proportion of malaria among the pregnant women attending to Sinnar teaching hospital.

2- To identify the possible factors associated with malaria infection among pregnant women.

1.4 Literature

1.4.1 Clinical Case Definition of Malaria :

1.4.1.1 Uncomplicated Malaria :

A Patient with fever or history of vever writhing the past 48 hours (with or without other symptoms such as nausea , vomiting , diarrhea , headache , back pain , chills , myalgia) in whom other obvious causes of fever have been excluded (WHO, 2005)

1.4.1.2 Severe malaria :

A Patient with symptoms as far uncomplicated malaria plus drowsiness with extreme weakness and associated signs and symptoms related to organ failure (e.g. disorientation , loss of consciousness , convulsions, severeanemia jaundice , hemoglobinuria , spontaneous bleeding , pulmonary oedema and shock (WHO, 2005).

1.4.1.3 Confirmed Case :

Demonstration of malaria parasites in blood Film by examining thick or thin smears , or by rapid diagnostic test for P.falciparum.

1.4.2 History of Malaria:

As early as 2700 BCE , a disease was transmitted through the air , the sixteenth century Italians called (malaria).The malaria parasite was discovered in 1880 by Charleuis and the malaria vector was discovered (female Anpheline mosquito)in 1897 by Ronald Ross and he showed that mosquitoes could transmit malaria parasite from bird to bird (CDC , 2006).

1.4.3 Problem statement:

More than one million death from malaria occur worldwide each year 90% of them in Africa south of Sahara. Around 30% of Africa's malaria death are in countries experiencing acute , chronic or post -

conflict complex emergency situation . Today it is estimated that over 200 million people in Africa alone are living in countries either directly or indirectly affected by complex emergencies (Toole & Waldman , 1990)**.**

Epidemics can occur when malaria attacks vulnerable populations in only a marginal benefit. Then, with the epidemic over, hard – won lessons are gradually forgotten, until the next epidemic comes along. To a large extent malaria epidemic are predictable, through a combination of socioeconomic and meteorological information and local epidemiological knowledge .Man – made epidemics, in particular, can be predicted with considerable precision, for example in relation to development projects, such as irrigation projects, fish ponds, dams, etc. Multi sectorial action at the planning stage can help prevent them from occurring. It is harder to predict malaria epidemics arising from natural cases. However, such epidemics tend to re occur, and it is important to learn from past experiences. WHO, with RBM partners, has supported retrospective analyses of malaria epidemics in several Africa countries (WHO, 2002).

The finding builds evidence practical WHO guidelines on malaria epidemics prevention and control in Africa. RBM and its partners are also supporting epidemic – prone countries in their efforts to develop comprehensive multicultural epidemic warning systems that combine early detection, early warning / Detection and long – range forecasting (WHO, 2002).

Malaria deaths during complex emergencies usually far exceed those caused by the conflict at the root of the emergency itself. The chaos that follows war or civil unrest can destroy health systems, cut

food supplies and expose people to multiple infections. Insecurity and poor living conditions in temporary camps and war – affected towns increase both peoples vulnerability to disease, and the infrastructure makes it difficult to address even basic health care needs (Toole & Waldman , 1990).

Malaria considered being endemic in 107 countries, about 90 % of the world malaria deaths occur in tropical Africa south of Sahara where the majority of infections are caused by most dangerous species plasmodium falciparum (WHO, 2002).

The number of malaria deaths in world has been estimated at (1.1 – 1.3)million in world death reports (1999- 2004)and incidence rate, in 2004 was between 350 – 500 million causes (WHO & UNICEF, 2003).

A round 5 million confirmed cases of malaria are reported each year from countries outside Africa South of Sahara, of which almost 3 million are from India and Pakistan in which the malaria situation has remained more or less unchanged for the last decade (WHO, 2004).

The vast majority of malaria deaths occur in Africa , south of the Sahara, where malaria also presents major obstacles to social and economic development .Malaria has been estimated to cost Africa more than US$ 12 billion every year in lost GDP , even though it could be controlled for a fraction of that sum34Annual economic growth in countries with high malaria transmission has historically been lower than in countries without malaria .Economists believe that malaria is responsible for a growth penalty of up to 1.3% per year in some Africa countries . When compounded over the years, this penalty leads to substantial differences in GDP between countries with and without malaria and severely restrains the economic growth of the entire region. Malaria also has a

direct impact on Africa's human resources .Not only does malaria result in lost life and lost productivity due to illness and premature death, but malaria also hampers children's schooling and social development through both absenteeism and permanent neurological and other damage associated with severe episodes of the disease (WHO ,2004).

One of the greatest challenges facing Africa in the fight against malaria is drug resistance. Resistance to chloroquine, the cheapest and most widely used ant malarial, is common throughout Africa(particularly in southern and eastern parts of the continent). In Africa to day malaria is understood to be both a disease of poverty and accuse of poverty(WHO & UNICEF, 2003).

1.4.4Malaria in Sudan:

Studies conducted at different parts of Sudan to measure the proportion of malaria among pregnant women found 20% in the study at Al Fula hospital (Salih, 2009) and 9.6% in that at Edd-wueim teaching hospital (Amira, 2007).

The total population is estimated to be 30.3 million inhabitants, of whom 75% live in rural areas. Whilst the whole population is at risk from the disease, there is higher incidence among pregnant woman and children under 5 year of age >This result in complicated pregnancies, low birth and infant mortality (FMH, Sudan, 2004). Studies in pediatric hospitals showed that cases fatality rate was 8%among children with severe malaria, children below three year of age were four times more likely to die from severe malaria than those above three years. (NMP,2001).

One member of roll back malaria (RBM) evaluation teams Dr. Wernsdorfer visited Sudan from 12 – 22 November 2002. Below is a

summary of the main findings and outcome of the visit. Malaria is the leading cause of morbidity and mortality in Sudan. The annual number of malaria cases is estimated at 75 million. Clinically manifest malaria affect nearly one quarter of country's population and accounts for 20% - 4% of total outpatient attendance and approximately 30% of the annual in patient capacity of hospital. The annual deaths from malaria are estimated in 35,000 respectively about 70% of malaria deaths recorded in region (Eastern Mediterranean Region). Almost the whole population of Sudan is at risk of malaria, albeit at different degrees regionallyP. falciparum is the predominate parasite species, accounting for approximately 90% of clinical malaria incidence and practically all mortality P.Vivax occurs only in the northern, eastern and occasionally in the western parts of the country, but not in the south. P.Malaria is encountered sporadically in the northern, eastern and western states , but very frequently in southern Sudan where it is mostly associated with p. falciparum (WHO, 2004).

The distribution of P.Ovale is mainly limited to the southern states. The predominant vector species in the northern, eastern and western states is Anopheles arabinoses. Malaria in northern, eastern and western states is mainly hypo- or mesoendemic with predominantly seasonal transmission. In southern Sudan it is hypo –or mesoendemic, with usually perennial transmission (WHO, 2004).

1.4.5Malaria Situation in Sinnar State:

Sinnar state located in central of the Sudan, P. falciparum caused (97%) of cases and the basic transmission is by Anopheles arabinoses, Breads in different sites so as pipes, season pools irrigation schemes canals .Resting in door, feeding in door and preferred human blood and resistant to Malathion Malaria is endemic in Sinnar state casing very high morbidity and mortality. It is responsible for about 24 – 35% of hospital admission 29 -40 of hospital attendance and caused 16-27% out of all deaths (SMOH, 2006).

Malaria is a major public health problem in Sinnar town It is responsible for 9415 of cases and 1987 of hospital admission and 26 deaths annually .The last epidemic in Sinnar town occurred from August to September 1999, caused by heavy rains and floods (SMOH, 2006).

1.4.6 EconomicImpact:

Beyond the human toll, malaria wreaks significant economic havoc in high – rate areas, decreasing Gross Domestic product (GDP) by as much as 1.3% in countries with high levels of transmission. Over the long – term, these aggregated annual losses have resulted in substantial differences in GDP between countries with and without malaria (particularly in Africa).

Malarias health costs include both personal and public expenditures on prevention and treatment in some heavy- burden countries, the disease accounts for:-

* Up to 40% of public health expenditures.
* 30% to 50% of inpatient hospital admissions
* Up to 60% of outpatient health clinic visits

Malaria disproportionately affects poor people who cannot afford treatment or have limited access to health care, and traps families and

communities in a downward spiral of poverty (WHO,2009) The economic burden of malaria to the country, the family and the individual is immense (WHO,2001) .

It has been estimated that it causes a reduction of 1.3% in the annual per capita economic growth rate of malaria endemic countries and the long term impact of this is a reduction of the GNP by more than a half. The economic effects of malaria are especially noticeable in rural areas where malaria strikes at the time of the year when there is greatest need for agricultural work (WHO& UNICEF, 2003). Malaria and poverty are intimately connected (Gallup & Sachs, 2000).

1.4.7 Geographical distribution:

Malaria is found depend mainly on climate factors such as temperature .Humidity and rainfalls malaria is transmitted in tropical and subtropical area where Anopheles mosquitoes can Survive and multiply. And malaria parasite can complete their growth cycle in the mosquitoes (CDC, 2006).

The highest transmission is found in Africa South Sahara – in cooler regions transmission will be less intense and more seasonal. In many temperature areas, such as Western Europe and the United States economic development and public health measures have success eliminate (CDC, 2006) And all of Sudan's population exposed to risk of malaria. The Sudan classified as following:-

1- Hyper endemic area – South of Sudan.

2- Seasonal Malaria in control of Sudan.

3-Hypo endemic – North of Sudan.

4- Urban malaria.

5- Agriculture project malaria (NMCP, 2004).

1.4.8 Environmental Factors:

Geographic position and climatic condition were for long favorable to the transmission of malaria.

a. **Season**: Malaria is a seasonal disease. In most parts ofIndia, the maximum prevalence is from July to November.

b. Temperature: Temperature affects the life cycle of the malaria parasite. The optimum temperature for the development of the malaria parasite in the insect vector is between 20 deg –to 30 deg . C(68deg- to 86 deg . F)The parasite causes to undergo development in the mosquito if the mean temperature is below 16 deg . C(60 . 8deg .F)Temperatures higher than 30deg. C are lethal to the parasite (park, 2005) .

c. Humidity: The atmospheric humidity has a direct effect on the length of life of the mosquito, although it has no effect on the parasite. A relative humidity of 60 percent is considered necessary for mosquitoes to live in a normal Span of life when the relative humidity is high, mosquitoes are more active and they feed more veraciously. If the humidity is low, mosquitoes do not live long (Park, 2005).

d. Rainfall: Rain in general provides opportunities for the breeding of mosquitoes and may give rise to epidemics of malaria rain increase the atmospheric humidity which is necessary for the survival of mosquitoes. However, rain may have an adverse effect in flushing out the breeding places.

paradoxically in some areas, (e.g.; Srilanka) severe epidemic of malaria of followed years of drought , It was because, the monsoon

rains led to formation of small polls of water in river beds , which served as active breeding places for malaria vectors. The relationship between rainfall (total and its distribution) and mosquito – breeding is of fundamental importance (Park, 2005).

e. Altitude: As a rule Anpheline are not found at altitudes bove 2000-2500 meters, due to unfavorable climatic conditions.

f. **Manmademalaria**: Burrowpits garden pool, irrigation channels and engineering projects have led to the breeding of mosquitoes and an increase in malaria. Malaria consequent on such human undertakings is called, man – mad malaria, (Park, 2005).

1.4.9 Vector of Malaria :

The vectors of major importance are Anculicifacies in rural areas and an Stephens is urban areas.In the absence of a vaccine, vector control is the only practical approach to malaria control. Acknowledgeof Anpheline biology is essential for understanding the epidemiology of malaria and its prevention (Park, 2005).

a. Density:

To be an effective vector, species must be present in adequate density in or near human habituations. A sudden increase in density of vectors may be a cause of epidemic outbreaks. For each vector, there is what is known as, critical density, below which effective transmission cannot be maintained in a community. This level varies with different species In the case of an culicifacies a high density is required for the propagation of malaria ;in the case of an fluviatilis which is every efficient vector, a much lower density would suffice (Park, 2005).

b. life cycle:

The nature life cycle of mosquito cover four stages eggs, Larvae, pupa and adult. Under favorable condition the eggs hatch in about 2 days The Larvae stages lasts about 5-7 days and the pupa about 2 days. Temperature is the main factor determining the length of these aquatic stage so of the mosquito. The adult may live from few days to few months, adult mosquitoes veryvulnerable to dryness (Herberm& Warrell , 1993)

c. Resting Habits:

After blood meal, some mosquitoes rest indoors on the walls for quite some time. This behaviors pattern is known as "endophily" Acknowledge of the resting habits (which must be under constant surveillance) is the basis for organizing rational anti- adult measures in fact, the concept of malaria eradication is based on endophilism (indoor resting habits of most malaria vector (park, 2005).

1.4.10 Malaria Diagnosis:

Case definition of Uncomplicated Malaria (UM)

i- Suspected malaria:-

Malaria is suspected when patient present with fever and other symptoms and signs suggestive of malaria (e.g. headache, vomiting, sweating).

ii- Confirmed Malaria:

A malaria case is confirmed by demonstration of asexual from of the parasite in thick or thin peripheral blood film or rapid diagnostic test in the presence of fever (NMCP, 2004).

1.4.10.1 Clinical malaria:

For management of malaria in adult and children where there is a malaria risk but there are no facilities for laboratory diagnosis, it's reasonable to assume that the patient has clinical malaria when there is no other obvious reason for fever.

1.4.10.2 Laboratory diagnosis of malaria:

For microscopic diagnosis of malaria, thick blood film is required good Laboratory setup is essential in addition to trained personnel. Giemsa stain is recommended to be used all over the country. In the result, the following should be stated clearly:

- Presence of infection (positive or negative).
- Stage of parasite.
- Parasite count (NMCP, 2004).

Rapid diagnosis test (RDTs): immune chromate graphic test (ICT), should be considered in relation to the intensity of transmission. In areas of high transmission (irrigated schemes and it is suitable in south of Sudan). Despite of their high cost, RDTs are useful: in the periphery as they can be performed, at emergency and epidemics situation, where the cost of malaria treatment is high to avoid unnecessary use of durgs (FMOH,2006).

1.4.10.3Agent factors:

Malaria in man caused by 4 species of the malaria parasite are the most common and p. falciparum the most deadly type of malaria infection and malaria parasite under goes 2 cyclists: the human cycle (sexual cycle) and mosquito cycle (sexual cycle)park, 2005)

1.4.10.4 Host Factors:

The main variables of the human element that have an influence on malaria epidemiology include the following:

a. Age Malaria affects all ages. New born infants have considerable resistance to infection with p. falicparum. This has been attributed to the high concentration of fetal hemoglobin during the first few months of life, which suppresses the development of p. falicparum (Park, 2005).

b. Sex: Males are more frequently exposed to the risk of lead. Further, females in India are usually better clothed than males (Park. 2005).

c. pregnancy: Pregnancy increases the risk of malaria in women . Malaria during pregnancy may cause intrauterine death of the fetus; it may also cause abortion (Park. 2005).

d. Socio-economic Development: Malaria has demonstrated the relationship between the health and socio – economic development .It is generally accepted that malaria has disappeared from most developed countries as a result of socio- economic development (park. 2005).

e. Housing: Housing plays an important role in the epidemiology of malaria. The ill- ventilated and ill – lighted houses provide ideal indoor resting places for mosquitoes malaria is acquired in most instances by mosquito- bites within the houses. The site, type of construction, nature of the walls,… etc. influence the selection of control measures (park. 2005).

f. population Mobility: People migrates for one reason or other from one country to another or from one country to another or form one part of country to another laborers connected with various

engineering, irrigation, agriculture and other project and periodic migration of nomads and wandering tribes outstanding examples of internal migration. Some of them may import malaria parasites in their blood and reintroduce malaria into areas become quite a public health problem in Europe .North America, and other temperate parts of the world owing to the rising tide of air.

g. Occupation: Malaria is predominantly a rural disease and closely related to agriculture practices.

h. Human habits: Habits such as sleeping out of doors, nomadism refusal to accepts spraying of house, re-plastering of walls after spraying and not using measure of personnel protection (e.g. bed nets) influence man – vector contact and obviously the choice of control measures (park. 2005).

i. Immunity: The epidemic of malaria is influenced by the immune status of the population . Immunity to malaria in human is acquired only after repeated exposure over several years. Thus in endemic malaria's area a state of collective immunity becomes established slowly , so that infants , young children migrants and travelers from non- endemic areas suffer most from the disease. Those, however, who survive to the adult age show less evidence of adverse effects to the attenuated infection. Infants born of immune mothers are generally protected during the first 3-5 months by maternal 19G antibody. Infants born of semi–immune mothers are only partially protected. Active immunity is species – specific, that is immunity against one strain does not protect against another. People living in endemic exposed continually to malaria develop considerable degree of resistance to clinical disease, but their endemic countries Semi –

immune individuals may harbor malaria parasites without presenting any symptoms of disease. Both humeral and cellular factors play a role in the protection (Park, 2005).

j. Education: The malaria demonstrated the relationship between health and socio economic development (Park, 2005).

1.4.11Mode of transmission:

a. Vector transmission: Malaria is transmitted by the bite of certain species of infected, female Anpheline mosquitoes. A single infected vector, during herlife time, may infect several persons. The mosquito is not infective unless the sporozoitesare presents in the salivary glands (Park. 2005).

b.Direct transmission: Malaria my by induced accidentally by hypodermic intramuscular and intravenous injections of blood or plasma e.g blood transfusion malaria in drug addicts. (Park, 2005).

1.4.12Clinical features of malaria:

Serum creatine phosphokinase concentration, myoglobinaemia and myoglobinuria)has frequently been found in Gambian children . In cerebral malaria, the cerebrospinal fluid (CSF) shows a mild Lymphocyte pleocytosis (rarely more than 15 cells/ ul) and increases protein concentration .The CSFglucose but may be very low or anemiaThe urine may contain protein erythrocytes , hemoglobin and red cells casts .

Gram- negative rod bacteria including Escherichia coli and pseudomonas a eruginosa have been cultured from the blood of adult patients with severe falciparum malaria , some of whom had clinical features are very rarely positive, but in the Gambia here is an

association between malaria and non- typhoid salmonella septicemia,(Herbem, et.al, 1993).

1.4.13Malaria Control:

The global malaria control strategy, as adopted by the ministerial conference in 1992, consists of the following four basic technical elements.

- Early diagnosis and prompt treatment.
- Planning and implementing selective and sustaining or preventive measures, including vector control. (Najera et.al, 2002).
- Detecting epidemics at an early stage and containing or preventing them; and (Najera, et al, 2002).
- Strengthening local capacities in basic and applied research to permit and promote the regular assessment of a country's malaria situation, and in particular, the ecological, social and economic determinants of the disease (Najera, et.al, 2002).

1.4.14Treatment of Malaria:

Treatment of uncomplicated falciparum malaria .As a response to the ant malarial drug resistance situation , who now recommends that treatment policies for falciparum malaria in all countries experiencing resistance to mono therapies , such as Chloroquine, sulfadoxinepyrimethamine and amodiaquineahould be combination therapies preferably those containing an artemisinin derivative(ACT-artemisinin- based combination therapy). The advantages of aremisinin derivatives that make them ideal combination partners are:

- Rapid reduction of parasite densities.
- Rapid reduction of clinical symptoms.

- Effective action against multi – drug resistant.

No documented resistance as yet with the use of artemisinin and its derivatives.

Few clinical adverse reaction and.

Reduction of gametocytes carrier rate which may reduce transmission (WHO,2001).

In Sudan the national malaria control programme recommends the use of Act as it is now the safest and most effective treatment The NMCP recommends the used of the following drug as 1st, 2nd and 3rd line treatment with the dosage and regiments indicate (NMCP.2004) First line treatment, the first line treatment in the Sudan is artesunateplussulfadoxine – pyrimethmin , in from of tablets (NMCP).

First dose: Give both (As + sp) simultaneously (4mg/kg body weight As)+ (25 mg/kg sulfadoxine + 1.25mg/kg pyrimethamine)

Second dose: Give (As) only (4mg/kg body weight (24 hours after the first dose) (NMCP, 2004)

Third dose: Give (As) only (4mg/kg body weight (24 hours after the dose) (NMCP,2004).

Second – line treatment:-

The second line treatment will be (Artemether - Iumefantrine)This is high effective, the following side effect have been reported: fatigue, anorexia nausea, vomiting abdominal pain, headache and skin rash (NMCP).

The treatment of second line is six doses: twice per day for three days. It is recommended that each dose of drug be taken with fatty

meal milk the dose should be repeated if the drug vomited with I hour (NMCP, 2004).

Third line treatment:

Quinine: quinine dihydrochloride or quinine sulphate orally should be used as a third line drug in case of non response to Artemether–Iumefantine the oral quinine dose for uncomplicated malaria is 10mg salt / kg body weight 8- hourly for 7 days(NMCP, 2004). Inject able quinine given by intramuscular route can be valuable initial treatment for a patient with uncomplicated malaria who is repeatedly vomiting and therefore unable to take drugs orally and as pre-referral dose (one dose once vomiting stopped oral quinine should be resumed the dose of 1 M quinine is 10mg salt/kg body weight given after dilution With sterile of normal saline or distilled water to concentration of 60mg/ml: the dose is divided into 2 halves and injected into both anterior and upper thighs(NMCP, 2004).

Drug Resistance :

Drug resistance to commonly used anti-malarial drugs has spread very rapidly. In order to avoid this for artemisinins, they should be used in combination as ACTs, and artemisinin immunotherapy (use of one artemisinin drug versus the more effective combination pill) should not be used. The less effective single – drug treatment increases the chance for parasites to evolve and become resistant to the medicine. Intensive monitoring of drug potency is essential to protect against the spread of resistant malaria strains to other parts of the world.

WHO recommends continuous monitoring and is assisting countries as they work to strengthen drug observation efforts. (WHO, 2009).

1.4.14Malaria control& prevention

1.4.14.1 Malaria preventive:

Is involved as following:

1.4.14.1.1 Use of anti- malaria drug prevention:

The role of chemoprophylaxis in malaria control has been considerably reduced in the last two decades in the in the past . WHO recommended that pregnant women and young children in malaria – endemic are should receive a full anti-malaria treatment on their first contact with the antenatal and postnatal service, followed by weekly chemoprophylaxis with choroquine (WHO, 1986).

The implementation of this policy was limited by a number of factors, including:

i) Spread of chloroquine resistance.

ii) Poor compliance with a weakly regime throughout pregnancy and childhood.

iii) Adverse drug effect.

iv) The contraindication of alternative drug during different stage of pregnancy and childhood (WHO,1994)

1.4.14.2 Vector control:

Vector control remains the most generally effective measure to prevent malaria transmission and therefore is one of the four basic technical elements of the Global Malaria Control Strategy. The principal objective of vector control is the reduction of malaria morbidity and mortality by reducing the levels of transmission Vector control methods vary considerably in their applicability, cost and sustainability of their results. The choice of vector control will depend on the magnitude of the malaria burden, the feasibility of

timely and correct application of the required interventions and the possibility of sustaining the resulting modified epidemiological situation. WHO recommends a systematic approach to vector control based on evidence and knowledge of the local situation this approach is called integrated vector management (IVM).

Vector control remains the most generally effective measures to prevent malaria transmission, and as such it is one of the four basic technical elements of the global malaria control strategy, There are basically tow of mosquito vector control Those direct against the adult and those against the aquatic stages as a process for managing vector population to reduces or interrupt transmission of disease (WHO, 2004).

The control options against adult mosquitoes:

- In door residual spraying (IRS) with insecticides.
- Insecticide – treated material such as mosquito nets (IYS; and).
- Ultra – low volume space spraying (fogging)(WHO, 2004f).

The control options against the aquatic stage (larval control) can be achieved by:

1- Environmental management.

2- Use of larvicides.

3- Larvivorous fish (WHO, 2000).

1.4.14.3 Individual Protection:

Man vector control can be reduced by much prevention such as repellents, protective clothing, bed nets and screening of house (WHO, 2004g).

1.4.14.4 Community Protection:

Communities are informed of what they can do to prevent and treat malaria, and health can never be adequate protected by health services without involvement of communities (Park, 2005).

1- This category covers all methods in which a barrier is established between vectors and humans and includes the following:

- Mosquito nets and insecticide treated mosquito nest.

Although untreated mosquito net have a long history of us in controlling malaria transmission , the introduction of net treatment with parathyroid insecticides or residual action has considerably increased their effectiveness by adding to the barrier effect of the net repellent and killing action of the insecticide (Najera et.al, 2002).

- House protection with screening of windows, and doors.

This is an effective method if properly implemented and maintained costs. (Najera et.al, 2002).

-Use of repellents: These may be applied either directly on the skin (as a cream, lotion or aerosol) or on clothes. The use of repellents is also only a measure of individual protection that can be recommended as a complement the use of bed nets and house protection method. The be used after dark before retiring under the mosquito net or by people who have to stay outdoors during some part of the night , In epidemics have been distributed in some malaria control programmes, although their cost – effectiveness remains doubtful (Najera et.al, 2002).

-Available vector control methods and their classification:

Vector control methods can be classified in different in different ways for different purposes. From an epidemiological point of view, it may be advisable to classify vector control methods according to the principal effect to be obtained and therefore the link in the chain of transmission most directly affected by their application. (Najera et.al, 2002).

1,4.14.5 Methods aimed mainly at reducing vector density:

These methods include all forms of larval control, as described below.

1.4.14.6 Source reduction by environmental management:

This includes drainage flushing filling and rendering river and lake making unsuitable for Anpheline breeding In general, these methods have relatively high investment costs and may be cost – effective only in urban areas or some types of development projects they are suitable for the elimination of permanent breeding places (Najera et.al, 2002) Environmental management methods should be seriously considered in agricultural production systems and in urban settings in certain areas Moreover, in a fully man- made environment, environmental should be the first line of defense in reducing malaria transmission risk(Najera et.al, 2002).

1.4.14.7 Larviciding:

This includes the use both of chemical insecticides and those of biological origin such as the laxin of Bacilusthuringienensis is raelensis and insect growth regulators .It requires the treatment of all breeding places, and may present the same problems as source reductionwhen temporary breeding places are of great

epidemiological importance. In control to sanitation methods, larvicides normally have little residual effect and require and frequent applications (Najera et.al, 2002).

1.4.14.8 Biological control:

For Anpheline, this is practically limited to the use predators (mainly larvivorus fish) , which are most effective in man – made breeding sires (e.g ponds, cisterns or irrigation system)although such predators suffer from the same problems of coverage as all the other anti- larval measures they may become established in more permanent form although , as with most natural interacting population , they will tend to establish an equilibrium with their prey, which will have to be disturbed by frequent seeding of the predator or pathogen concerned (Najera et.al, 2002).

1.4.14.9 Space spraying of insecticides:

Space spraying has been extensively used for controlling epidemics of mosquito- borne disease such as dengue and some types of encephalitis It has only occasionally been in malaria epidemic control and as a complementary measure against vectors. Its main limitation is the difficulty of applying mat night, when vectors are flying and the poor penetration of insecticide fogs into the day time resting places of the vectors. In addition it may be difficult to mobilize all the necessary resources, for space spraying before the epidemic declines naturally (Najera et.al, 2002).

1.4.14.10 Methods aimed mainly at increasing adult vector mortality:

Increasing adult's vector mortality reduces their expectation of life and therefore the probability that the parasite will complete its development. Although density will usually also be reduced. The reduction in the daily survival of the vector has a disproportionately greater impact on adult vector mortality are described below(Najera et.al, 2002).

In door residual insecticides, thus greeting the killing effect to house resting vectors and constituting a most efficient way of using the insecticide to kill vectors likely to transmit malaria although pyrethrum was the insecticide fist used indoor spraying of insecticides become the most popular method of malaria vector control with the introduction of DDT and other residual insecticides. Its main limitation is that exospheric vectors may exist and may not come into contact with sprayed surfaces. In addition, this behavioral trait may be selected as a result of people's social and cultural beliefs about malaria (Najera et.al ,2002).

In door residual spraying (IRS) and insecticide treated nets (ITNS) are the main stay in malaria stay in malaria prevention , As vector control interventions , both are effective in preventing malaria morbidity and mortality in arrange of epidemiological setting (WHO, 2002) Community wide use of insecticide treated nets. When a large proportion of the population in a community is protected by insecticide- treated nets there may be a significant reduction of vector survival, density and sporozoiterate (mass impact) and hence of malaria transmission , and a corresponding increase in community protection (Najera et.al, 2002).

1.4.15Over view of malaria control activities and programme progress in Sudan:

Sudan has a long history of malaria control activities, dating as far back as the beginning of the 20th century, when very successful interventions based on trained volunteers (the mosquito men) and simple vector control strategies led to the near elimination of malaria from many parts of northern Sudan .In contrast , the attempt at malaria eradication in the 1950 – 60s had very limited success due to managerial technical and financial constraints, In 1998 Sudan endorsed the international Roll Boll Malaria initiative as the organizing principle for its own activities , placing more attention on early diagnosis and prompt treatment and multiple prevention measures.

The National Malaria Control Programme is under the department of the preventive medicine in the organ gram of the FMOH and it consists from five main departments Headed by the National malaria control programme coordinator(FMOH, 2006).

The NMCP has developed state malaria control program me in 15 states and each SMCP consist from three department (see organ gram) The responsibilities of the national and the states programme are as follows:

- Setting national policies and strategies and plans for malaria control.
- Setting standards, develop guide lines, and quality assurance.
- Establishing states malaria control units.
- Conduct human resource needs assessment and develop capacity building plans for all levels.

1.4.16Gambia project:

Collaborated between Egypt and Sudan amid to control of malaria in Gambia area (Northern state, locality of Abo hamad, locality of new Halfa border north up to Aswan).

- Responsibilities of Sudan provision of:

a.Man power:

1. Technical laboratory
2. Mosquito net.
3. Health assistance.
4. Health office.
5. Other pertinence.

b) Activities of control anopheles (larva and adults)

c) Management.

- Egypt responsibilities provision of:-

1. Transportation
2. Insecticides(residual, larvicides)
3. Microscopes
4. Fuel
5. Laboratory equipment(Gamma stain , slid) and other equipment.
6. They entered mosquito net (ITNs) in recent years.
7. Protected clothes

Evaluation will be done every sex month (Feb. - oct). The Abuga Malaria Summit 2000Amid to strengthen national health system, with the following goals by the year 2005:

- 60% of malaria patients have access to appropriate treatment
- 60% of children and pregnant are protected

- 60% pregnant have access to appropriate chemoprophylaxis

1.4.17Malaria Control during pregnancy in Sudan:

In addition to the adequate treatment of clinical episodes and malaria prevention using LLIN Intermittent preventive Treatment (IPT) has been adopted in Southern Sudan as a key strategy to reduce the burden of malaria in pregnancy following the most recent WHO guidelines at least 2 doses of SP are recommended for all women and at least 3 doses for those known to be infected with HIV. NGOs and health workers have been sensitized on this strategy and additional. Supplies of SP procured but exact data on the coverage level for IPT2 are not available (FMOH, 2006).

1.4.18Prevention and Control of Malaria During pregnancy in Sub – Saharan Africa:

The World Health Organization currently recommends a three-pronged approach to prevent these adverse effects in areas of Africa with high levels of transmission of plasmodium falciparum malaria:Intermittent preventive treatment (IPT) with ant malarial drugs Insecticide – treated bed nets (ITN). Each of these interventions is considered safe, effective affordable, and deliverable (CDC, 2004)

The advent of long- lasting insecticidal nets and artemisinin-based combination therapy, plusa revival of support for indoor residual spraying of insecticide, presents a new opportunity for large – scale malaria control. The World malaria report 2008 describes the global distribution of cases and deaths how WHO – recommended control strategies have been adopted and implemented in endemic countries, sources of funding for malaria control and recent evidence

that prevention and treatment can alleviate the burden of disease (WHO, 2008).

Malaria is the leading cause of morbidity and mortality in Sudan Symptomatic malaria accounts for 20-40 of outpatient clinic vivisects and approximately 30% of hospital admissions the entire population of Sudan is at risk of malaria, although to different degrees .In the northern eastern and western states malaria is mainly low to moderate with predominantly seasonal transmission and epidemic outbreaks. In southern Sudan malaria is moderate to high or highly intense, generally with perennial transmission .p. falciparum is by far the predominant parasite species Between the 1970 and the mid – 1990s, malaria control efforts suffered major disruptions. Khartoum State, formerly a nearly malaria – free area, increasinglysuffered from malaria epidemics, with more than 700 000cases annually between 1998and 2001.In 1998, with the support of WHO, the government initiated a plan to revitalize malaria control. In 2001, a. National 10- year strategic plan was developed; in 2002 the Malaria free Initiative was launched; in 2003, a plan was developed for scaling up the use of ITNs including using communication for behavioral impact; and in 2004 a national policy for control of malaria in pregnancy was initiated(WHO,2005).

Also in 2004, the national drug policy was updated to use the ACT ASU + SP for first- line treatment. . The infrastructure of the programme continues to be strengthened. The federal malaria control office and malaria control units in the priority states of Gezira, Khartoum and White Nile were established with full operations by the end of 2001. Training was extended to a large part of the curative

health care and environmental health structures, which are an integral part of the malaria control efforts in these states, a network of sentinel sites for epidemic early warning and monitoring of drug and insecticide resistance, were also established. In Gezira, ITN coverage has reached 30% of the target population and large – scale distribution of subsidized ITNs to pregnant women and children continues, Community mobilization and participation have resulted in a high degree of public awareness of malaria and its control in the priority states. In nine more states, malaria control units were strengthened in 2000 – 2001. This development was accompanied by a major effort in staff training (WHO,2005).

Partnerships with numerous NGOs have been instrumental and are expected to be central to scaling up interventions. Limited financial resources and delay in the release of a GFATM grant have hindered the implementation of the new drug policy and the plan for scaling up the use of ITNs Malaria diagnosis and treatment in public sector health facilities are payable by the patient, which follows the principle of cost sharing; there is some evidence that his limits the use of public sector facilities and promotes haphazard self – treatment (WHO,2005).

1.4.19 Malaria During pregnancy:

In the area with stable malaria transmition, adult women are semi-immune to malaria and therefore most malaria infection contribute to the development of severe anemia in the mother , resulting in an increased risk of maternal mortality .

Malaria during pregnant also impact the infant's health , As a result of infect of the placenta and malaria caused material anemia ,

which both contribute to low birth weight the single biggest risk faction for neonatal mortal . A safe mother-hood survey in 1999 in Sudan found that 46 % of infant mortality occurred during the neonatal period (FMOH, 2008).

Malaria infection during pregnancy can have adverse effects on both mother and fetus including maternal anemia fetal loss, premature delivery, intrauterine growth retardation and delivery of low birth – weight infants (<2500g or <5.5 pounds) It is a particular problem for women in their first and second pregnancies and for women who are HIV- positive. The problems that malaria infection causes differ somewhat by the type of malaria transmission area: stable (high) or unstable (low) transmission Low transmission areas, women have of immunity to malaria that wanes somewhat during pregnancy. Malaria infection is more likely to result in severe maternal anemia and delivery of low birth – weight infants.

In low transmission areas, women generally have developed no immunity to malaria .Malaria infection is more likely to result in severe malaria disease, maternal anemia premature delivery, or fetal loss. Each year more than 25 million pregnant women in malaria – endemic areas (mainly Africa) are at risk of plasmodium falciparum infection, with serious consequences for mother and unborn child .Malaria prevention in pregnancy is a priority for RBM, which recommends a three pronged approach:

i) Effective case management of malaria infections.

ii) Use of insecticide treated nets (ITN s).

iii) Intermittent preventive treatment (IPT)in areas of stable transmission.

Pregnant women living in areas of low or epidemic (unstable) transmission have little or no immunity to malaria ; they are at a 2-3 fold higher risk of developing severe disease as a result directly , from complications of severe malaria (especially hypoglycemia, cerebral malaria and pulmonary edema) or indirectly, from severe anemia . Malaria in pregnancy can also result in still birth, spontaneous abortion, and low birth weight (LBW) and neonatal deaths. Whatever the epidemiological situation for malaria, infection with human immunodeficiency virus (HIV)impairs a pregnant women's ability to control p. falciparum infection (WHO, 2005).

1.4.20Impact of Malaria during Pregnancy in Sub- Saharan Africa:-

In sub – Saharan Africa the region of the world hardest hit by malaria , malaria infection is estimated to cause 400,000 cases of severe maternal anemia and from 75,000 – 200,000 infant deaths annually . Maternal anemia contributes significantly to maternal mortality and causes an estimated 10,000 deaths per year.

Low birth weight is the greatest risk factor for neonatal mortality and a major contributor to infant mortality. Although many factors contribute to low birth weight, malaria is a major factor and one of the few, along with poor nutrition, anemia and other infections, that is amenable to intervention once a woman becomes pregnant, Each year more than 25 million pregnant women in malaria – endemic areas (mainly Africa) are at risk of plasmodium flaciparum infection, with serious consequences for mother and unborn child. Malaria prevention in pregnancy is a priority for RBM which recommends a three pronged approach:

i) Effective case management of malaria infections.

ii) Use of insecticide treated nets (ITNs).

iii) Intermittent preventive treatment (IPT) in areas of stable transmission(WHO, 2005).

Pregnant women living in areas of low or epidemic (unstable) transmission have little or no immunity to malaria, they are at a 2-3 fold higher risk of developing severe disease as a result directly, from complications of severs malaria (especially hypoglycemia , cerebral malaria and pulmonary oedema) or , indirectly in still birth , spontaneous abortion and low birth weight (LBW) and neonatal deat6hs. Whatever the epidemiological situation for malaria. Infection with human immunodeficiency virus (HIV) impairs a pregnant women ability to control p. falciparum infection. Pregnant women ability to control p. falciparum infection. Pregnant women with HIV infection are more likely to have symptomatic malaria infection and have an increased risk of adverse birth outcomes by malaria appears to be independent infection with p. falciparum during pregnancy result in a wide range of adverse consequences for pregnant women , the developing fetus and new born infant.

1.4.31Effects of infections with other malaria species:-

The effects of the other three parasites that malaria in human (P. vivax,P. malaria, and P. ovale) are less clear . Pregnant women in Africa at risk for P. vivax infection reside primary in area of low or unstable transmission .In these areas, P. vivax infections are likely to result in febrile illness. A study among nonimmune pregnancy in Thailand reported that P. vivax malaria during pregnancy in associated with malaria and LBW but to a lesser extent than is P.

vivax infection on the health of pregnant African women and new born (WHO, 2002).

The symptoms and complications of malaria during pregnancy differ according to the intensity of malaria transmission in a particular setting according to the intensity of malaria transmission in a particular setting and thus the pregnant women's level of immunity, While two distinct epidemiologic setting are recognized, in reality, the intensity of transmission and immunity in pregnant women occur on continuum, with potentially diverse conditions occurring within a single country. (WHO, 2002).Stable transmission predominates in Africa south of the Sahara; and consequently, this region bears the greatest burden of malaria infections during pregnancy. In these areas of high or moderate (stable) malaria transmission, the ill health effects are particularly apparent in the first and second malaria – exposed pregnancies (WHO, 2002).

Despite the higher prevalence of parasitaemia and higher parasite density in pregnant women than non pregnant women, p. falciparum infection in pregnant women in these areas is usually asymptomatic. Maternal immunity reduces the risk of severe illness. Thus, clinical malaria is not a prominent feature of the infection during pregnancy, and in settings of stable malaria transmission, maternal mortality due solely to malaria is uncommon. In these settings the major determinate effect of infection is LBW and maternal anemia (WHO, 2002).

In areas of unstable malaria transmission , women of reproductive age have relatively little acquired immunity to malaria , and hence all pregnant women are at similar risk for malaria

infection , Its consequences in these settings are maternal illness , severe malaria with central nervous system complications , anemia , and adverse reproductive outcome , including stillbirths , abortions , and LBW . Malaria infection contributes to pregnant loss in the first trimester contributes to premature delivery. Other consequences during commonly associated with p. falciparum infection include hypoglycemia, severe haemolyticanemia and pulmonary oedema(WHO, 2002).

Those 750,000 are in areas with high malaria transmission: intense perennial, high seasonal transmission or in areas of irrigation. Malaria in Africa is estimated to cause 15% of maternal anemia; about 10,000 maternal deaths / year and 35% preventable low birth weight The mortality and morbidity of MIP is higher than in non pregnant women. The risk is even more increased in primigraidae. There is evidence of maternal immune – suppression in the second half of pregnancy which is caused by many factors (hormonal, placenta and lymphocytic) in addition to malaria infection itself.Reduced immunity to malaria in pregnancy leads to more relapses of malaria and more parasitaemia and so worsens clinical manifestations. MIP is a risk to both pregnant women and baby:

- primigraidae and HIV positive women are at greater risk malaria and the therefore anemia , severe malaria and death .
- Placenta infection leads to low birth weight, a major risk for malaria and therefore to infant illness and deaths.
- P. flaciparum is the commonest malaria infection and can lead to acute renal failure , pulmonary edema or several malaria with convulsion and coma.

- Tran placenta infection the fetus can occur.
- The risks of MIP are high so prompt chemotherapy for malaria is mandatory (NMCP,2004).

The policy for malaria prevention and control during pregnancy in areas of stable transmission emphasis a package of intermittent preventive treatment (IPT) and insecticide – treated nets (ITNs) and ensure effective case management of malaria, illness and anemia. ITN s and ensure prompt effective case management are recommended for pregnant women living in malaria areas (WHO, 2006). Effective case management of malaria illness for all pregnant women in malarious areas must be assured iron supplementation for the prevention and treatment of anemia should be given to pregnant women as of anemia, and those with anemia should be managed according to national reproductive health guidelines (WHO, 2006).

As an integral part of the WHO making pregnancy safe strategy IPT is included in the control policies. Including shop keeper and supplying pre- packaged quality assured medicines. Home management is how included in the national control strategies in 22 Africa countries and 2 countries in Eastern Mediterranean (WHO, 2005).

Since antenatal care attendance reasonably well established in AfricaRBM suggested relying on ANC to accelerate programme implementation of malaria control during pregnancy in those areas with stable malaria transmission and high ANC attendance, in areas with low ANC coverage, emphasis is placed on the development strengthening of community- based programmes. Many women in Africa particularly in remote areas have limited access to standard

medical care and effective malaria control tools. Delivery of cost-effective malaria prevention to pregnant women will require other strengthening ANS, integration of malaria prevention with other health programmes targeted at pregnant women and infants increased community awareness and considerable financial investment (WHO, 2005).

Materials and Methods

2.1Study design:

descriptive cross sectional studywas conducted to study the proportion of malaria among pregnant women attending Sinnar Teaching Hospitalfrom mayth1– June th1 /2009 .

2.2The Study area:

Sinnar Teaching Hospital is situated in sinnar state in Sinnar Locality in central east of Sudan which established(1933).

The climate poor savannah which is very hot in summer and dry cool in winter . The annual rain fall (200-450) up to 800 mm , rain season start at June and end at September , highest temperature (30-40 c) at April and May , lowest temperature at December and January , highest relative humidity (>80%) at March and Aril .

Sinnar Teaching Hospital consists of all the most of the importance and necessary for patient ; department , laboratories , X – ray rooms, blood bank, dentists, medicine, surgery, vaccination unite, statistical department, administrative officers, in addition to pharmacy, twelve (12) wards rooms with (210) total number of workers (265) among those (14) doctors and (4) consultant .

2.3The Study population :

The study population was constituted of All pregnant women attending Sinnar teaching hospital during the period of the study.

2.4 Sampling:

2.4.1Sample Size :-

A sample of 145 pregnant women attending to Sinnar Teaching Hospitalduring study period.

2.4.2Sample Technique :-

The total Coveverge

2.5Data collection methods :

The following methods were used in collation of data to satisfy the objectives of this study :-

2.5.1 questionnaire :

The questionnaire was used as base to interview mothers , which covered demographic, socio-economic and environmental factors and also covered the awareness level of the study group towards malaria disease .

2.5.2 Laboratory investigation :

The blood film for malaria covered the target group , and investigated by malaria lap of sinnar hospital .

Materials:-

Materials that were utilized in this study to run the selected test were as follows :-

- Sterile
- Disposable
- Micro
- Lancets
- Staining
- Gars
- And rakes for drying slides
- Giemsa stain (stock solution)
- Distilled water
- 300 microscopic glass slides
- Immersion oil

- Methyl alcohol and cotton
- Microscope
- Marker for labeling

Examination steps :-

After presence of pregnant women takes venous blood our capillary, there is two ways to prepare blood film for malaria :-

- Thick film is large amount of blood in small area
- Thin film little amount of blood in a large area, it needs fixation to identify the species of the parasite.

Method for blood films preparation:-

To prepare thick and thin films, perfectly clean microscope slides (7x2.6cm) which were free from grease or scratches, were used. Blood was obtained from the second or third finger of the left hand. The skin was cleaned with ether and dried before puncture with a sterile disposable lancet (WHO, 1991) the finger was squeezed gently to obtain a large drop of blood, and gently touched to the slide. The spread evenly with a corner of another slide until it was about 10- 15 mm in diameter and at thickness through which it is possible to see the print. The slides were kept horizontal on a rack while drying in a safe area. For a thin blood film preparation , the drop of blood which was obtained as explained previously , was smaller than the drop for thick film and it was spread immediately by the smooth edge of another clean slide (spreader) , which was applied to the blood at an angle 45 and the spreader stopped until the blood spreads along the edge . Then pushed forward at the same angle and the film was dried out .Thick and thin films were taken on the same slide

andthe serial number of the patients was written on it with a marker pen (WHO ,1991).

Method for staining thick and thin blood films:-

All blood films were stained later after complete sampling , they were then stained by giemsa stain as follows :-

Before starting the staining method , all dried thin films were fixed with absolute methyl alcohol by putting a few drops of alcohol on the film by a pipette for many seconds . Then 3% solution of giemsa was prepared freshly from stock solution by diluting 1.5 ml of the stock with 50 ml of distilled water . Then all slides (including thick and thin films) were stained in the staining jar for 30 minutes . The films were put in an upright position that allowed any debris to fall to the bottom of the jar .Then they were gently flushed with tap water (taking care not to wash the blood away) .They were stood upright in the rack to dry.

Microscopic examination of blood films:-

Blood films were examined under the microscope : the thick films were examined firstly using an oil immersion lens . they were tested for malaria parasites and their density determined in at least 100 microscopic fields (in accordance with the WHO criteria , before negativity was declared).

The parasite presence was confirmed by the examination of thin films , which identifies other plasmodium species . positive slides were classified after finding the parasite (one or more stages) in the blood films while the negative ones were not classified before examining the parasite asexual and sexual stages in at least 100 microscopic field .

2.6 Data analysis :--

data were analyzed using Statistical Package for the social Science (SPSS). The different variables were checked using chi-square . The p.value less than 0.05 considered significant.

Results

The data obtained from (145) pregnant women showed the following results:

Table (1) shows that malaria positivity was found among15.9% pregnant women attending Sinnar Teaching Hospital .

P. falciparum malaria was the most common type since it infected 95.7% of the pregnant women, while vivax malaria was next as shown in Table (2).

Table (3) showsthe distribution of malaria cases according to age groups among pregnant women. It was foundthat 22.2% of the pregnant women who were infected by malaria were (35 - 44) years.

Table (4) shows thatmalaria infected 24% of the pregnant women who were illiterate compared with other education levels .

Table (5) shows that malaria cases were found among 23.3% of workingwomen. Table (6) shows that malaria positivity was foundamong83.2% pregnant women whose monthly family incomewas less than 300 SDG.

Table (7) shows that only 4.1% of the pregnant women who used insecticide treated nets were infected with malaria compared to 21.3% who did not used ITNs. Table (8) shows that malaria cases were foundamong only 9.25% of the studysample who used intermittent preventive treatment compared to 21.3% who did not use IPT .

Table (9) shows that malaria infection was foundamong 6.2% of the pregnant women who lived in screened houses compared to 64.7% living in non-screened houses. Table (10) reveals that 31.3% of the study sample who had accumulated water near their residence

were malaria positive whereas 8.2% of them, who had no accumulation of water near their houses, were malaria negative.

Table (11) shows that positive malaria was foundamong33.3% pregnant women who mentioned that there was accumulation of water indoor compared to 10.1% who had no accumulation of water indoor .

Table (12) shows that malaria infection was foundamong8.7% of the pregnant women who lived in houses covered by vector control activities compared to 22.4% living in houses not covered by vector control activities .

Table (13) shows that malaria cases were found among 44.4% of the pregnant women who were aware of malaria and among3% who were oflow awareness .

Table (14) shows that malaria positivitywas found among 6.2% thestudy group who had Knowledge about malaria vector and among23.8% who had little knowledge about malaria vector.

Table (1): Result Of blood Film examination for malaria among pregnant women at Sinnar Teaching Hospital, May, (2009).

n =145

Result of blood examination	No	%
Malaria (+ ve)	23	15.9
Malaria (- ve)	122	84.1
Total	145	100.0

Table (2): Type of parasite species among pregnant women at Sinnar Teaching Hospital, May, 2009.

n =145

Type	Frequency	Percentage
Falciparum	**22**	**95.7**
Vivax	**1**	**4.3**
Total	**23**	**100%**

Table(3): Age distribution of pregnant women in relation to malaria disease at Sinnar Teaching Hospital , May, (2009).

n =145

Malaria / Age	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
15 – 24	13	18.8	59	81.2	69	47.6
25 – 34	8	11.9	59	88.1	67	46.2
34-44	2	22.2	7	77.8	9	6.2
Total	23	15.9	122	84.1	145	100

X^2 = 1.504 **p. value = 0.472**

Not significant

Table (4): Educational level of the study's groupin relation to Malaria infection at Sinnar Teaching Hospital, May, (2009).

n =145

Malaria / Educational level	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Illiterates	12	24	59	81.2	50	34.5
Primary / basic school	7	13.2	46	86.8	53	36.6
Higher secondary school	3	10.3	26	89.7	29 20	
University	1	7.7	12	92.3	13	9
Total	23	15.9	122	84.1	145	100

X^2 = 4.073 **p. value = 0.025**

Significant

Table (5): Occupations among the study population in relation to malaria at Sinnar Teaching Hospital, May, (2009).

n =145

Malaria / Occupations	Malaria(+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Housewife	3	13.6	19	86.4	22	15.2
Worker	16	23.2	53	76.8	69	47.6
Employee	4	8	46	92	50	34.5
Other	0	0	4	100	4	2.8
Total	23	15.9	122	84	145	100

X^2 = 8.040 p. value =0.045

significant

Table (6): Family income per month in Sudanese pound in relation to malaria among the study population at Sinnar Teaching Hospital, May, (2009).

n =145

Malaria / Income	Malaria (+ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Less than 300	19	83.2	19	16.8	113	77.9
400 – 301	4	14.8	23	85.2	27	18.6
401 and above	0	0	5	100	5	3.4
Total	23	5.9	122	84.1	145	100

X^2 = 10.4 **p. value = 0.04**

Significant

Table (7): use of mosquito net among the study's population in relation to Malaria at Sinnar Teaching Hospital, May, (2009).

n =145

Malaria / Using	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Use mosquito net	5	4.1	116	5.9	121	83.4
Do not use mosquito net	18	75	6	25	24	16.6
Total	23	15.9	122	84.1	145	100

$X^2 = 7.53$ p. value = 0.0001

significant

Table (8): Use of intermittent preventive treatment in relation to malaria cases of pregnant women at Sinnar Teaching Hospital, May, (2009).

n =145

Malaria / Using drug	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Use	6	9.2	59	90.8	65	44.8
Not Using	17	21.3	63	78.8	80	55.2
Total	23	15.9	122	84.1	145	100

X^2 = 3.88 **p. value = 0.04**

Significant

Table (9): Screening windows at houses in relation to malaria among the study population at Sinnar Teaching Hospital, May, (2009)

n =145

Malaria / Using	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Use	7	6.2	106	93.8	113	79
Not use	14	46.7	16	53.3	30	21
Total	23	15.9	122	84.1	145	100

X^2 = 30.9 **p. value = 0.0001**

significant

Table (10): Accumulation of water near the house area of the study group in relation to malaria at Sinnar Teaching Hospital, May, (2009)

n =145

Malaria / Accumulation of water	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Yes	15	31.3	33	68.8	48	33.1
No	8	8.2	89	91.8	97	66.9
Total	23	5.9	122	84.1	145	100

$X^2 = 12.731$ p. value = 0.001

Significant

Table (11): Accumulation of water indoor of the study population in relation to malaria at Sinnar Teaching Hospital, May, (2009).

n =145

Malaria / Accumulation of water	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Yes	12	33.3	24	66.7	69	47.6
No	11	10.1	98	89.9	109	75.2
Total	23	15.9	122	84.1	145	100

$X^2 = 10.953$ p. value = 0.001

significant

Table (12) : Organized vector control activities concerning malaria control among the study group in relation to malaria at Sinnar Teaching Hospital, May,(2009).

n =145

Malaria / Campaigning	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Yes	6	8.7	63	91.3	69	47.6
No	17	22.4	59	77.6	76	52.4
Total	23	15.9	122	84.1	145	100

$X^2 = 5.066$ p. value = 0.024

significant

Total (13) Awareness of malaria among pregnant women in relation to malaria at Sinnar Teaching Hospital, May (2009)

Malaria / Awareness	Malaria (+ ve)		Malaria (- ve)		Total	
	No	%	No	%	No	%
Aware	20	44.4	25	55.6	45	31
Un aware	3	3	97	97	100	69
Total	23	15.9	122	84.1	145	100

X^2 =39.942 **p. value =0.001**

Significant

Table (14) Knowledge about malaria vector among the study population in relation to malaria at Sinnar Teaching Hospital, May (2009)

Malaria / Knowledge	Malaria (+ ve)		Malaria (= ve)		Total	
	No	%	No	%	No	%
Knowledge	4	6.2	61	93.8	65	44.8
Not knowledge	19	23.8	61	76.2	80	55.2
Total	23	15.9	122	84.1	145	100

X^2 =8.320 p. value =0.004

Significant

4.1 Discussion

This is a descriptive cross sectional hospital based study. It was conducted to study the proportion of malaria among pregnant women attending Sinnar Teaching Hospital in the period from 1/5 to 1/6, 2009.

The result showed that the proportion of malaria among pregnant women was (15.9%). This result is in line with that found among pregnant women at El fula hospital15.1% (Salih, 2009).Also our resultis greater than that recorded among pregnant women in Eldeweim 9.6% (Amira, 2007).

The study showed that the P. falciparum was morecommon species 95.2% among pregnant women who contracted malaria. This result agrees with that found by(SMOH, 2006)which showed {P. falciparum97% of cases}and also agrees with (WHO , 2004) (p. falciparum is the predominate parasite , accounting for approximately 90% of clinical malaria incidence).

The result showed no significant statistical association between age and malaria positivity P. value = (0.472). This finding agrees with that found by (Park, 2005) which showed (malaria affected all ages).

The result revealed significant statistical association between family income per month and malaria positivity (p v =0.05). This result accords with that mentioned by (WHO, 2009) which shows that {malaria affects poor people who cannot afford treatment or have limited access to health care and communities in down ward spiral of poverty}.

The results showed a statistical association between the use of insecticide treated nets, intermittent preventive treatment and malaria infection P.values = (0.0001), (0.04). These results agree with that found by (WHO, 2006) who found that(in areas of stable transmission emphasis package of intermittent preventive treatment and insecticide- treated nets.

The results also revealed that there was a significant statistical association between occupation and education level of mothers , awareness about malaria and knowledge about malaria vector and malaria positivity p.values = (0.04) , (0.025) , (0.0001) , (0.004) respectively. These findings agree with that found by (Park, 2005), he said (malaria demonstrated the relationship between health and socioeconomic).

The result showed a statistical association between screen on windows and doors in houses and malaria positivity P.value = (0.0001). This result agrees with that found by (Najera et al, 2002).They revealed that (house protection with screening windows, eaves doors is an effective method if properly implemented and maintained).

The study showed a significant statistical association between accumulation of water near and indoor houses and malaria positivity P.values = (0.04), (0.0001). This result agrees with that found by (Park, 2005) who mentioned that (to be an effective vector speech must be present in adequate or near human habitation).

The result showed a statistical association between organizing vector control activities and malaria infection P.value=(0.02). This result agrees with that found by (WHO, 2007) which mentioned

(vector control, generally, remains the main and effective measure to prevent malaria transmission).

4.2 Conclusion:

The proportion of malaria among pregnant women was (15.9%). 95.9% of malaria cases were falciparum specie infection .The study showed a significant statistical association between occupation and education level among pregnant women and malaria positivity P.values = (0.045) , (0.025) respectively.

The results also showed a significant statistical relationship between family income and knowledge and malaria infection P.values = (0.04) , (0.0001),respectively. The study revealed a significant statistical association between use of mosquito bed nets , intermittent preventive treatment and screen on windows and door at houses and malaria positivity P.values = (0.0001) , (0.04) , (0.0001), respectively.

4.3 Recommendations:

Based on the results obtained, the study recommends:

- Prevention measure must be encouraged by using insecticide treated nets and introducing the prophylaxes therapy policy.
- Health education programmes should be introduced to raise awareness and knowledge about malaria.

References

- Amira .A. (2007). Epidemiology of Malaria Among Pregnant Women at Edd-uweim Teaching Hospital . Khartoum.
- Baraka , S.A (2009).). Epidemiology of Malaria Among Pregnant Women at Al salam Hospital . Khartoum.
- Central of Disease Control (CDC). (2006). History of malaria.Available at www.cdc.com .
- Federal Ministry of Health (FMOH) (2006). Sudan Malaria Control Strategic Plan (2006-2011). Sudan.
- Federal Ministry of Health (2004). The National Protocol for Treatment of Malaria. Sudan.
- Fedral Ministry of Health (2006). The National Protocol for Treatment of Malaria. Sudan.
- Federal Ministry of Health (FMOH).(2008). The Malaria in Pregnancy Control Strategic Plan, Sudan.
- Gallup J.l and Sachs (2001). The Economic Burden of Malaria. Am. J.trop. Med .Hug. 64 (1). pp (85-96).
- Herberm, M.G.and Warrell (1993). Essential malariology. London.3th edition.pp(124-136).
- Ismaeel, S.M (2003). country report malaria vector control and other vector born disease. Khartoum Sudan 21-23 January.
- Najera,J.M and Zaim.M(2002).MalariaVectorControl.Decision Making Criteria and Procedures for Judicious Use of Insecticide.Geneva.5Rev.1.page(12-16).
- National Malaria Control Program (NMCP). (2001).The National Protocol For Treatment of Malaria . Sudan.

- National malaria control program (NMCP). (2004). the national protocol For Treatment of Malaria . Sudan.
- Park, J.E (2005) . Preventive and Social Medicine . India. 18th Edition ; pp (205 - 212).
- Sinnar Ministry of Health (SMOH) . (2006). Malaria Control Programme . Sinnar .
- SinnarMinistryofHealth(2006).MalariaControl Programme. Sinnar State .
- Toole, M.j and Waldman (1990). Prevention of excess mortality in refugee and displaced populations in developing countries.
- United Nation Development Programme (UNDP) / World Bank/ WorldHealthOrganization(WHO). (2004).Special Programme for Research and Training in Tropical Diseases . Geneva, Switzerland.
- WorldHealthOrganization(WHO) .(2005).Rool Back Malaria World Health Organization UNICEF, WORLD MALARIA Report 2005. Geneva.
- World Health Organization (WHO).(2002).Roll Back Malaria in the WHOEastern Mediterranean Region Nasr City. Cairo / Egypt.
- World Health Organization (WHO).(2003). The African Malaria Report, WHO/ UNICIF.Geneva.

- WorldHealthOrganization(WHO). (2009).Fact Sheet No 94 January .Geneva.
- World Health Organization (WHO). (2001).Report of The Commission On Macroeconomics and Health. Geneva.

- World Health Organization (WHO). (2003). A policy Frame Work forMalaria Prevention And Control inPregnancy in the Africa Region 19 December.Geneva.
- World Health Organization (WHO) . (2000). Implementation of Role Back Malaria in the Six Mekong Countries. Report of a Planning Meeting 2-4 March WHO / Credit Default Swap (CDS) /Roll Back Malaria (RBM).Hochimlnh City.
- World Health Organization (WHO). (1986).WHO Expert CommitteeonMalaria.Geneva. 18th Report. Seriesno335 . SF 14.
- World Health Organization (WHO).(1994). Anti Malaria Drug Policies:DataRequirements,Treatmentof Uncomplicated Malaria and Management of Malaria in Pregnancy .Geneva.
- WorldHealthOrganization(WHO). (2008). The Who Global Malaria Program. Geneva.
- WorldHealthOrganization(WHO).(2006).Malaria in Pregnancy. Geneva.
- WorldHealthOrganization(WHO).(2009). Fact Sheet No 94 January . Geneva.
- World Health Organization (WHO). (2001). The Use of Anti Malaria Drugs .Geneva.
- World Health Organization (WHO). (2004).Current Status and Trend , Malaria Control / Roll Back Malaria.Geneva.
- WorldHealthOrganization(WHO).(2004).Malaria Epidemics .fore Casting , Prevention, Early Detection and Control. Geneva.
- WorldHealthOrganization(WHO).(2004).International Ravel andHealth;VaccinationRequirementsandHealthAdvice. Geneva.

- WorldHealthOrganization(WHO). (2004).Malaria and HIV / AIDS Integrations and Policy Implication. Geneva.
- WorldHealthOrganization(WHO).(2004).OnIhe Responsiveness of the RBM Programme to Country Needs in The WHOEastern Mediterranean Region . Cairo , Egypt.
- WorldHealthOrganization(WHO).(2005). Roll Back Malaria " What is the Malaria ? "Info Sheet 1.Availble at (www.who.int).

بسم الله الرحمن الرحيم

جامعة الخرطوم

كلية الصحة العامة وصحة البيئة

استبيان لدراسة مرض الملاريا وسط النساء

الحوامل بمستشفي سنار التعليمي (2009)

التاريخ..../...../.....

رقم المتسلسل ..... اسم الحامل.....

1- العمر:

أ-15 – 24 سنة ( ) ب- 25 – 34 سنة ( ) ج- 35- 44 ( )

2- المهنة:- أ ربة منزل ( ) ب- موظفة ( ) ج- عاملة ( ) د- أخري حددي .....

3- مستوي تعليم الحامل :

أ- أمي ( ) ب- ابتدائي / متوسطة ( ) ج- ثانوي ( ) د - جامعي وما فوق الجامعي( )

4- الدخل الشهري بالجنية السوداني :

أ- أقل من 300 ( ) ب- 301-400 ( ) ج- 401 فما فوق ( ).

5- هلتوجدناموسياتفيالمنزل :- أ- نعم ( ) ب- لا ( )

6- هل تستخدمين الناموسية؟ أ- نعم ( ) ب- لا ( )

7- اذا كانت الاجابة لا لماذا لا تستخدمينها ؟ أ- لا احبها **( )** ب- غيرمريحةللاستعمال(**) ج-** لا تقينا من البعوض **( )**

8- هل توجد حملات رش منظمة بالمنطقة السكنية؟ أ- نعم ( ) ب- لا ( )

9- مانوع هذه الحملات ؟ أ- رش ذو اثر باقي ( ) ب- رش ضبابي ( )

ج- رش للاطوار المائية ( )

10- هل توجد نمالي علي النوافذ بالمنزل؟ أ- نعم ( ) ب- لا ( )

11- هل توجد تجمعات مياه داخل المنزل تؤدي الي توالد الباعوض؟

أ- نعم ( ) ب- لا ( )

12- هل توجد برك او مواسير مكسرة بالقرب من المنطقة السكنية؟

أ- نعم ( ) ب- لا ( )

13- اذا كانت الإجابة بنعم ماهي ؟

أ- برك ( ) ب- مستنقعات ( ) ج- مواسير مكسرة ( ) د- أخري حددي .....

14- هل سمعتي بأدوية الوقاية الكيمائية أثناء الحمل ؟

أ- نعم ( ) ب- لا ( )

15- اذا كانت الاجابة نعم هل تستخدمين أدوية الوقاية الكيمائية أثناء الحمل؟

أ- نعم ( ) ب- لا ( )

16- اذاكانتالإجابةبلاماذا؟ أ- تضر بالجنين ( ) ب- تؤثر علي صحة الأم ( ) ج- تؤدي للاجهاض ( ) د- لا اعرف ( ) هـ - أخري حددي.....

17- هلتعرفينالملاريا؟ أ- نعم ( ) ب- لا ( )

18- ماهياعراضها؟ أ- حمي ( ) ب- صداع ( ) ج- ألام المفاصل والظهر ( ) د- تغيؤ / غثيان ( ) هـ - كل ما سبق ذكر ( )

19- ماهياعراضالملاريأثناءالحمل؟

أ- فقر الدم الحاد ( ) ب- الاجهاض / الولادة المبكرة / وفاة الجنين ( )

ج- انخفاض السكر في الدم () د- كل ما ذكر ( ) هـ - لا اعرف ( )

20- ماهوناقل الملاريا ؟

أ- الذباب المنزلي ( ) ب- الذباب الرملي ( ) ج- الباعوض ( ) د- التعب والارهاق ( ) هـ - أخري حددي .....

21- ماهيمواقعتوالدالباعوض ؟

أ- البالوعات ( ) ب- الاشجار ( ) ج- المواسير المكسرة ( )

د- خزان المياه ( ) هـ- المياه الراكدة ( )

د- أخري حددي .....

22- نتيجة الفحص المعملي :أ- مصاب ( ) ب- غير مصاب ( )

23- نوع الطفيل.

أ- منجليه ( ) ب- نشيطة ( ) ج- وبالية ( ) د- بيضاوية ( )

Faculty of public & Environmental Health

Department of Epidemiology

Questions for Study of malaria among pregnant women at Sinnar Teaching Hospital , 2009

1 – Serial No ……Date ……

2 – Name ……..

3 – Age a- 15 – 24 ( ) b- 25 – 34 ( )c-35 44( )

4 – Educational level :a. Illiterate ( ) b- primary – basic school ( ) c- Higher secondary school ( ) d- University &Higher graduate ( )

5- Occupation: a. House wife ( ) b. Employee ( ) c- Worker ( ) d. Other ……specify

6 – Monthly income per Sudanese pound: a. <300 ( ) b. 301 – 400 ( ) c. 401and above ( )

7- Do you know malaria? a. Yes ( ) b. No ( )

8- What is malaria vector ?a. House flies ( ) b- Mosquitoes ( ) c. Sand fly ( ) d.Weakness& fatigue ( ) e. Other ……..…….. specify ( )

9 – What are the sings & symptoms? a. fever ( ) b. Headache ( ) c. Muscle pain ( ) d. Vomiting – Nausea ( ) e. All of the above ( ) f. Others …..specify

10- What are the complications of malaria during pregnancy? a. Anemia ( ) b. Abortion , premature delivery still birth ( ) c. Hypoglycemia ( ) d. All of the above ( ) e. Don't know ( )

11- Is there accumulation of water in home lead to mosquito breeding ? a. Yes ( ) b. No ()

12- Have you bed nets in home ? Yes ( ) b. No ( )

13-. If the answer yes , do you use it ? a. Yes ( ) b. No ( )

14- If the answer no , why not use ? a. Is not effective ( )
b. I dislike it ( ) c. Not mosquito season ( )
d. Discomfort able ( )
15- Is there accumulation of water in the residential area ?
a. Yes ( ) b. No ( )
16 – If the answer yes , what kinds ? a. Borrow pits ( )
b. Little branches drains ( ) c. Broken water pipes
( ) d. Others …..specify
17– What are mosquitoes breeding sites ? a. Trees ( )
b. Broken pipes ( ) c. Stagnant water ( )
18 – Do you heard about intermittent preventive treatment (IPT) during pregnancy for malaria ? a. Yes ( ) b. No ( )
19- Did you ever used IPT during pregnancy ? a. Yes ( ) b. No ( )
20 – If the answer no , why ? a. Theratogenic effect ( ) b. Impair the mother health ( ) c. Lead to abortion ( ) d. Don't know ( ) e. Other …… specify
21- Is there regulatory campaigns concerning malaria vector control?a. Yes ( ) b. No ( )
22- The kinds of campaigns are : a. Indoor residual spraying ( )
b. Ultra – Low volume space spraying (Fogging)( )
c. Applying Larvacide ( )
23 – Diagnosis accomplished laboratory , result is ?
a. positive (+ ve) ( ) b. Negative(- ve) ( )
24- The parasite species: a. p. falciprum ( ) b. p. vivax ( )
c) p. malaria ( ) d) p. Ovale ( )

Anti-malarial drugs for malaria in pregnancy and puerperium (F M O H, 2004).

Pregnancy in weeks	Uncomplicated malaria	Severe malaria	Prevention in high Transmission area
0-12	Quinine	Quinine	-
13-36	First option quinine or 3 days quinine followed by sp • Second option (As + sp)	Quinine or Artmether	3 tabs SP first and Again after at least One month
37-delivery	• Fir option Quinine or 3 days quinine followed by sp • Second option (As + sp)	Quinine or Artmether	-
puerperium	As + sp	Quinine or Artmether	-