

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Nearly half of the world's population is at risk of malaria. Malaria causes approximately 300-500 million clinical cases and 1.1-2.7 million deaths annually (WHO, 2006).

Malaria is a vector borne disease caused by infection parasites of genus plasmodium. It is transmitted to man through the bite of an infected female mosquito of genus *Anopheles*. Parasites can also be transmitted through blood transfusion, and transplacentally (Kumar and Clark, 2009)

Malaria in pregnancy is an obstetric, social, and medical problem requiring multidisciplinary approaches. Pregnant women are the main adult risk group for malaria and approximately 80% of deaths due to malaria in Africa occur in pregnant women and children below 5 years of age.

Malaria and pregnancy are mutually aggravating conditions. The physiological changes of pregnancy and pathological changes due to malaria have a synergistic effect on the course of each other, making life precarious for the mother, fetus and the treating physician (Africa Malaria Report, 2004).

MIP causes anemia, hypoglycemia, cerebral malaria, disseminated intravascular coagulation, and death in the mother. In the fetus and neonates MIP can lead to congenital malaria, still birth, spontaneous abortion, low birth weight, premature deli intrauterine growth reduction, and increased neonatal deaths (Africa malaria report, 2003).

Risk factors for MIP are primigravidae, HIV infection, younger maternal age, and second trimester. Diagnosis of MIP is difficult due to Parasite placental sequestration. However, thick and thin smears of peripheral blood, and RDTs, are the main stay of diagnosis. Polymerase chain reaction, though costly, can also be used to diagnose Malaria in Pregnancy (MOH, 2006).

Malaria in pregnancy is estimated to account for 20% of the maternal mortality ratio, and 40% of infant mortality rate (MOH, 2005). In Zambia malaria transmission is seasonal, occurring mainly from November to May and the majority of cases are caused by *p.falciparum* (WHO 2008). Health information reveals that malaria, across all age groups, has been the top of morbidity and mortality for the past 11 years in Kaoma district (1998-2008).

1.2 STATEMENT OF THE PROBLEM:

Malaria is a leading cause of mortality and morbidity in many developing countries .However the coverage of the key malaria control interventions in most countries, including Zambia, is below the 80% target set by the World Health Assembly (WHO 2008).This means residents of malaria endemic areas, especially vulnerable groups such as pregnant women and children of 5 years or less, are exposed to risk of malaria infection.

Phenomena such as reduced vector control efforts, HIV/AIDS pandemic, low access to health care, and high poverty levels in developing countries are associated with high incidence and case fatality of malaria (WHO, 2007).

The adverse outcomes of malaria in pregnancy are well documented. Globally malaria in pregnancy contributes 2.5% maternal anemia, 8-36% of prematurity, 13-70% of intra-uterine growth retardation, 8-14% of low birth weight, and 3-8% of infant deaths.

The maternal mortality ratio in Zambia is 591/100000 live births (ZDHS 2007), and 20% of this is estimated to be caused by malaria in pregnancy (MOH, 2006).

According to 2008 Western province annual statistical bulletin Kaoma had an incidence rate of malaria of 251/1000, while the case fatality was 26/1000 admissions, and still birth rate of 3%.These figures demonstrate that malaria is a huge public health problem in Kaoma district.

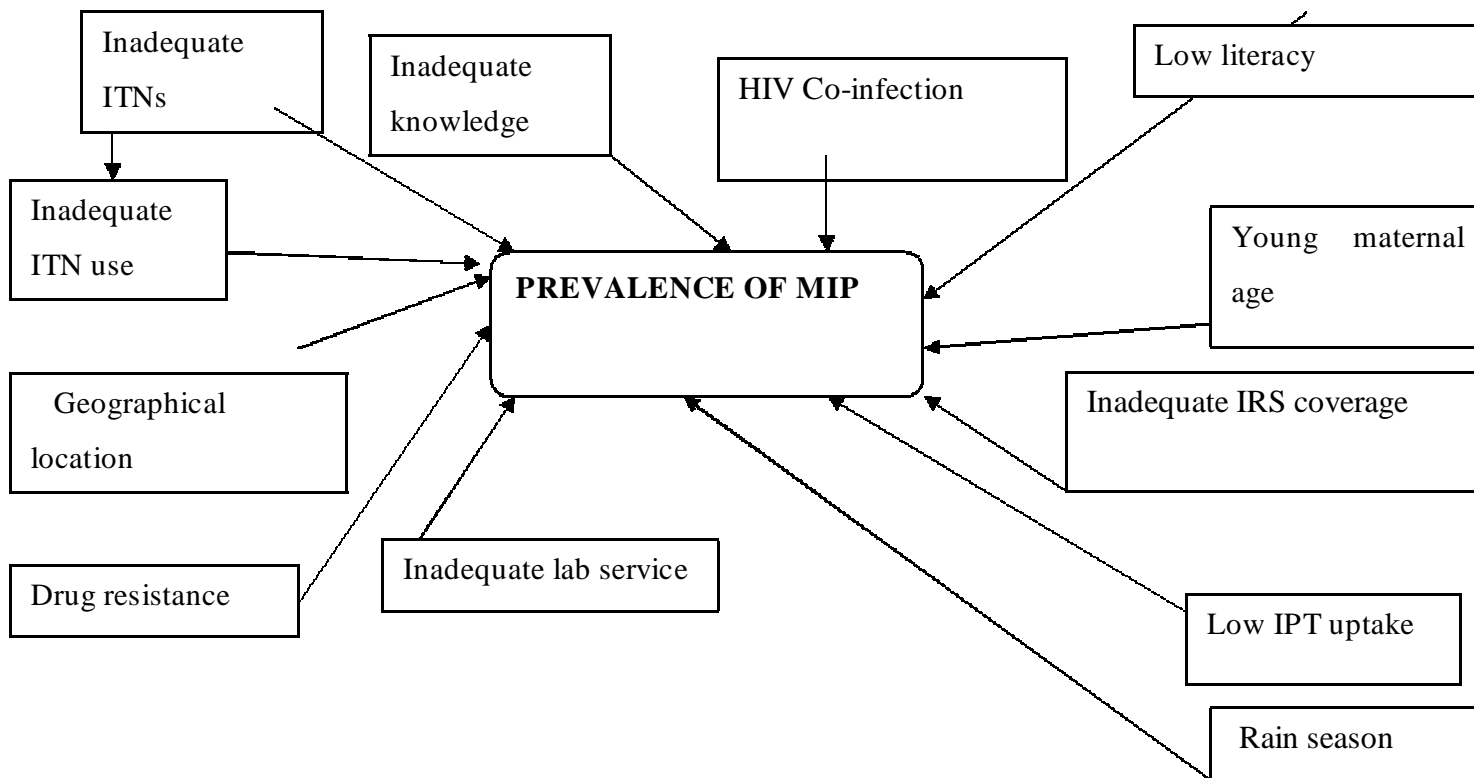
According to HMIS 2008, the coverage of interventions such as intermittent presumptive therapy, indoor residual spraying, insect treated nets, access to prompt and effective treatment is all below the roll back malaria targets of 80% in Kaoma district.

The pregnant women are therefore at risk of malaria infection. The burden of malaria in pregnancy therefore needs to be systematically investigated and quantified.

PROBLEM ANALYSIS DIAGRAM

Figure 1 indicates that high prevalence of malaria in pregnancy could be influenced by several factors in Kaoma district. These include young maternal age, high HIV prevalence, high illiteracy levels, inadequate knowledge on malaria interventions, shortage of insect treated nets, and inadequate utilization of ITNs. Reduced implementation of malaria control activities due to withdrawal of funding by some co-operating partners and the global financial crisis could also contribute to a high prevalence of malaria in pregnancy. Other factors include inadequacies in laboratory services, drug resistance, poor case management, low coverage of indoor residual spraying, and primigravidity status.

FIGURE 1



1.3 study justification

Malaria in pregnancy is a major public health priority area for Kaoma district medical Office. Several data and studies show that there is a wide variation of levels of prevalence of malaria in pregnancy in different regions and during different seasons. This means that prevalence from studies undertaken outside Kaoma may not be relied upon to estimate prevalence of malaria in pregnancy in Kaoma district. Therefore there is need to undertake systematic research to determine prevalence of malaria in pregnancy and its associated factors in Kaoma district.

The prevalence of HIV as revealed by prevention of mother to child transmission (PMTCT) data is high in the district. Therefore in a substantial proportion of pregnant women there is co-infection of HIV and malaria in pregnancy. HIV infection has been shown to reduce the capacity of malaria- HIV co infected pregnant women to control Plasmodium falciparum infect and decreased efficacy of anti malaria interventions such as drugs therapy.

There is also evidence to show that intermittent presu therapy with sulphadoxine-pyrimethamine (fansidar) interacts with some antiretroviral drugs and co-trimoxazole. Research is needed to be undertaken to estimate and gain insight into the prevalence of malaria in pregnancy in the light of widespread co-infections of malaria and HIV.

In the light of the low coverage of the intermittent presumptive therapy, insect treated nets, indoor residual spraying and prompt and effective case management among the general population and pregnant women inclusive, the burden of malaria in pregnancy needs to be investigated.

This study seeks to find out the prevalence of malaria in pregnancy, its geographical distribution pattern and factors associated with the presence of the infection.

The findings of the research will be utilized by Kaoma district medical office and ministry of health in order to reduce malaria in pregnancy and finally eradicate it.

1.4: Research question

What is the prevalence of malaria in pregnancy in Kaoma district?

CHAPTER TWO

2.0 LITERATURE REVIEW LITERATURE REVIEW

Globally approximately 50 million pregnant are exposed to malaria each year worldwide. Women are more susceptible to malaria when they become pregnant placing the life of the mother and fetus at risk of adverse consequences (Lindsay, 2000).

Pregnant women are the main adult risk group because of their altered immunity during pregnancy. This favors sequestration and adhesion of the *P.falciparum* parasites infected red blood cells in the placenta (Ukoko et al, 2003) which leads to prolonged parasite clearance (Brabin, 2004)

There is substantial evidence of the effects of interactions between malaria and HIV/AIDS in pregnant women. HIV infection impairs the ability of pregnant women to control *p.falciparum* infection. They are more likely to develop clinical and placental malaria with higher parasite densities in peripheral blood. Coinfected women are at an increased risk of anemia, preterm birth and intrauterine growth retardation. The presence of HIV/AIDS may result in a poorer response to treatment with antimalarials and to intermittent presumptive therapy for malaria in pregnancy. There is a risk of adverse reactions if SP for IPT and cotrimoxazole against opportunistic infections are taken together (WHO, 2006).

HIV increases the risk of malaria infection, high density parasite and clinical malaria and severe malaria and malaria related mortality (Khasnis 2003)

Prompt and accurate diagnosis of malaria is part of effective disease management and will, if implemented effectively, help to reduce unnecessary use of antimalarials. High sensitivity of malaria diagnosis is important in all settings, especially in the vulnerable groups. The two methods in use for parasitological diagnosis are light microscopy and rapid diagnostic tests. Light microscopy is cheap, highly sensitive and specific when used by well skilled personnel. The sensitivity and specificity of RDTs are variable, their vulnerability to high temperatures and humidity is an important constraint (WHO, 2008).

According to P.Mens et al (2004) laboratory confirmation is essential as the malaria burden is overestimated if the diagnosis is made clinically. Microscopy is a reliable method in rural areas where malaria is prevalent. However RDTs offer a good alternative with the advantage that they

are an easy and a rapid method. Molecular tests (PCR) are difficult, but they are tools for the near future.

It is estimated that in endemic areas, Malaria in Pregnancy contributes to an estimated 2.5% of maternal anemia, 8-36% prematurity, 13-70% of IUGR, 8-14% of low birth weight, and 3-8% of infant deaths. The adverse outcomes of pregnancy are most common during first and second pregnancies. (WHO, 2004)

Household surveys and data from national malaria control programs (NMCPs) indicate that the coverage of all interventions in 2006 was far lower in most African countries than the 80% target set by the World Health Assembly. Surveys found that 34% of households owned an ITN, 23% of pregnant women slept under an ITN, 18% of pregnant women used IPT, and only 5 countries reported coverage of at least 70% of people at risk (World Malaria Report, 2008)

Pregnant women are more likely to develop severe malaria than other adults, often complicated by pulmonary edema and hypoglycaemia. Maternal mortality, fetal death and premature birth are common in MIP. MIP has been associated with severe mid-trimester hemolytic anemia requiring transfusion in addition to antimalaria treatment (WHO, 2006)

The burden of malaria in pregnancy is caused mainly by the plasmodium falciparum parasite infection. Pregnant women are more susceptible to malaria thereby placing both the mother and fetus at risk (Steketee, 2001).

According to WHO 2009 World Health Statistics the global maternal mortality ratio of 400 maternal deaths per 100,000 live births in 2005 has barely changed since 1990. Most maternal deaths occur in the African region, where MMR is 900 per 100,000 live births with no measurable progress between 1990 and 2005. Progress in reducing mortality and morbidity depends on better access to and use of good maternal and reproductive health services.

In areas of low and unstable malaria transmission women do not acquire immunity and are susceptible to episodes of acute and severe malaria and fetal and maternal death (Nosten, 2004)

At the regional level each year approximately 25 million women become pregnant in endemic areas and are at risk of p.falciparum malaria, which contributes to maternal and neonatal morbidity and mortality (WHO, 2006).

The prevalence of malaria in pregnancy in Lagos, South West Nigeria is 7.7%. The factors identified to increase the risk of malaria infection include young maternal age and primigravidity (Chimere et al, 2009).

According to VanEijk et al 2001 density of parasitaemia was highest in primigravidae, lowered by 2nd pregnancies and was least in women in their third or more pregnancies.

The observed incidence of low birth weight and prevalence of placental parasitaemia at delivery suggests that malaria remains a problem in pregnancy in an area with a high bed net coverage when eligible women don't receive IPT. IPT should therefore be emphasized at all levels of implementation to achieve maximum community coverage. (Kabanywanyi et al 2008).

According to Brentlinger et al 2006, maternal malaria and its consequences can be substantially diminished through use of ITNs, IPT with two or more doses of anti malaria after first trimester and effective case management of malaria and anemia.

Intermittent presumptive therapy with sulphadoxine- pyrimethamine is effective in preventing maternal and placental malaria as well as improving pregnancy outcomes among parturient women in Ibadan, Nigeria. (Falade et al 2007)

Data suggests that a package of IPT/SP and ITN is effective in reducing the burden of malaria during pregnancy in Burkina Faso (Sodomion et al 2007).

Philip B Adongo et al in 2005 found that people recognize the term malaria but have limited biomedical knowledge of the disease, including etiology the role of the vector and host response. The people acknowledged a role for ITNs in nuisance reduction but not for malaria prevention indicating the level of knowledge about malaria is low in communities.

At the national level malaria is a major health problem and is endemic throughout Zambia. The Zambian government has identified malaria as one of its main public health priorities. In this regard the government developed a National Malaria Strategic plan aimed at significantly scaling up malaria interventions towards the achievements of the national vision of a malaria free Zambia. The government is implementing this strategic plan within the rollback malaria framework (MIS, 2008).

Efforts to control malaria are currently being scaled out by the National Malaria Control Centre with the help of various Roll back partners.

It is a leading cause of morbidity and mortality accounting for 45% of all hospitalizations and outpatient attendancies. It is estimated that malaria is responsible for 4.3 million cases and 50,000 deaths per year. It accounts for 20% of maternal mortality ratio and 40% of infant mortality rate (MOH, 2005)

In urban areas 53% of households and 54% of rural households have at least one ITN. In urban areas 29% of pregnant women reported sleeping under an ITN, while 34% of pregnant women in rural areas reported sleeping under an ITN the night before the survey (ZDHS 2007). According to the Zambia Malaria Indicator survey, 2008, 70% of pregnant women took at least two doses of IPT during pregnancy (ZMIS, 2008).

In a study by Chanda et al the prevalence of *P. falciparum* among pregnant women at antenatal clinics was found to be 6.9%, 8.8% in the under fives, 5.97% in the well children were found to have *P. falciparum*. No other parasites were found. The average sensitivity of para pf was found to be 83% and the specificity was 98%.

In another study by J. Chipeta et al (2007) asymptomatic pregnant women revealed parasitaemia rate of 4.3%, with 90% of women being anaemic. Parasitaemic density correlated well with anemic severity while there was no correlation with IPT intervention. The adverse pregnancy outcomes were spontaneous abortions/miscarriages (90%). Most of these adverse outcomes prior 2 weeks of pregnancy. Primigravidae were more susceptible to Pregnancy associated malaria than their multigravidae counterparts. The current protocol of IPT in pregnancy may need review and modification to enable effective and adequate coverage and prevention of pregnancy associated malaria and adverse pregnancy outcomes.

Baboo et al (2006) demonstrated that RDTs for detection of malaria *P. falc* was highly sensitive (96.1%) but less specific (53.8%) for the diagnosis of malaria plasmodium with a positive predictive value of 80.2% and a negative predictive value of 87.6%.

The malaria disease burden at the local level has been devastating. According to the 2008 annual statistical bulletin, for the western province, malaria is a top cause of morbidity and mortality. Kaoma has an incidence rate of 251/1,000 while the case fatality rate is 26/1,000. Maternal mortality ratio for Kaoma is 296/100,000 live births, while the still birth rates is 3%.

Review of the Kaoma HMIS revealed that malaria has been the top cause of morbidity and mortality for the past 11 years.

The literature review revealed that malaria in pregnancy is a major public health problem, with a wide range of undesirable outcomes in pregnancy. It also demonstrated that the coverage of the malaria control interventions below 80% target and therefore a significant number of pregnant women are still exposed to malaria infection. Literature revealed that the prevalence of malaria in pregnancy varies from region to region. It also revealed that malaria is a seasonal disease and its prevalence varies according to seasons.

Among the several other findings was that diagnosis of malaria can be done by the use of RDTs especially in settings where microscopy is difficult due to shortage and non availability of skilled personnel.

CHAPTER THREE

3.0 Objectives

3.1 General objective:

To determine the prevalence of malaria in pregnancy and its associated factors in Kaoma district.

3.2 Specific objectives:

- 1) To determine the proportion of women with malaria in pregnancy in selected clinics in Kaoma district.
- 2) To determine the factors (demographic, environmental and service) associated with malaria in pregnancy in Kaoma district.
- 3) To determine the geographical distribution of the malaria disease burden in pregnancy burden in Kaoma district.

3.3.0 Definition of key terms

3.3.1 RDT:

An immunochromatographic test that detects parasite specific antigens in a finger prick blood sample. It's an antigen based stick, cassette or card test for malaria in which a colored line indicates that plasmodia antigens have been detected.

3.3.2 Malaria in pregnancy:

In this study malaria in pregnancy refers to a positive RDT test regardless of presence or absence of symptoms.

3.3.3 IPT:

In Zambia this refers to giving sulphadoxine-pyrimethamine (fansidar) to a pregnant woman after 16 weeks of gestation following the last normal menstrual period. Two more doses are given, at least 4 weeks apart during the second and the third trimesters. The total number of doses recommended for the entire duration of pregnancy is three doses.

3.3.4 Maternal Mortality Ratio (MMR):

The number of maternal deaths per hundred thousand live births.

3.3.5 Plasmodium:

A genus of plasmodium vertebrate parasites that includes the causal agents for malaria

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter describes the research methodology comprising of variables (dependant and independent), study design, study setting, study population, sampling, sample size, data collections tools and techniques, ethical consideration.

4.1. Variables and indicators of measurements

Dependent variable

Malaria in pregnancy (Positive reaction of Rapid diagnostic test)

Independent variables

a) Demographic factors/background variables:

The variables are maternal age, gestational age, educational level, marital status, religion, knowledge, and household size.

b) Socio-economic factors:

The socio-economic related variables include occupation and employment status

c) Host factors:

The host related variable here is gravidity (the number of pregnancies a pregnant woman has had).

d) Environmental factors:

The environmental related variables include the coverage of Indoor residual spraying (IRS), timing of IRS, and reasons for not doing residual spraying in households of pregnant women. Others are ITN possession and utilization.

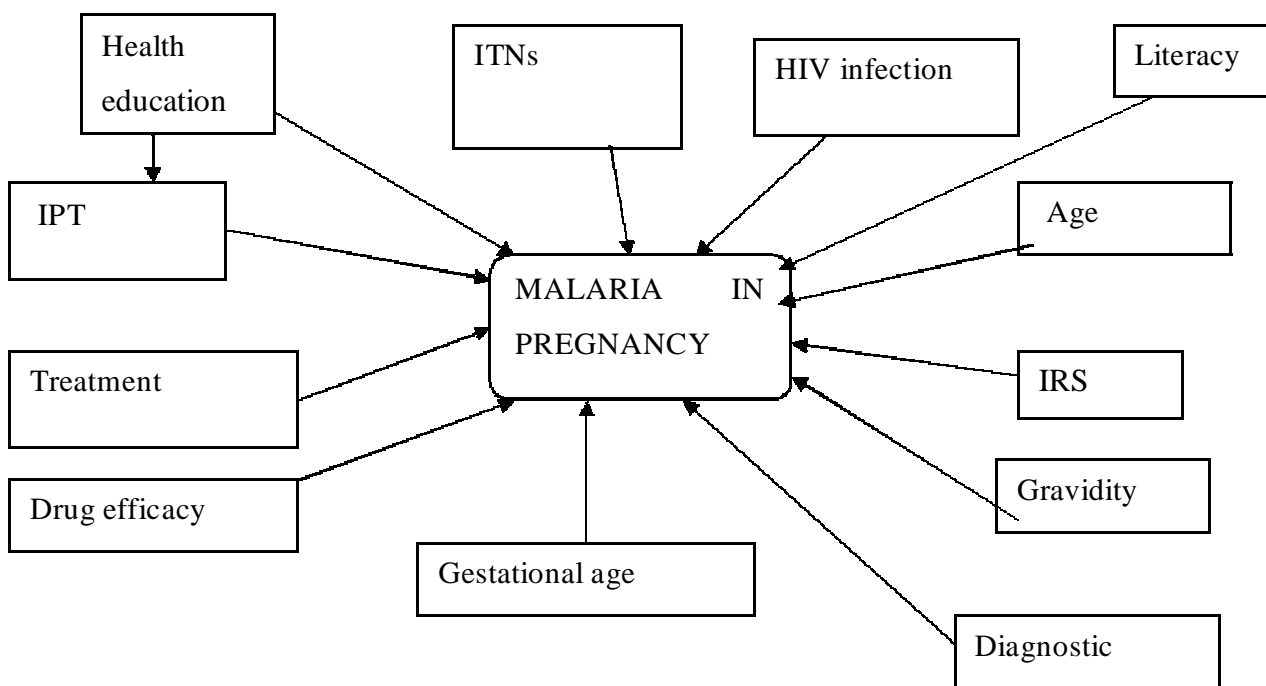
e) Service factors:

The service related variables included availability and type of anti malaria drugs, drug resistance diagnostic services (Microscopy, RDTs and clinical).

CONCEPTUAL FRAMEWORK

There are various variables that can influence the prevalence of malaria in pregnancy in Kaoma district. These variables include maternal age, number of pregnancies, HIV prevalence, illiteracy level and level of knowledge about malaria in pregnancy. ITNs ownership and utilization are other variables that need to be measured as they can influence malaria in pregnancy. Coverage of indoor residual spraying, availability and utilization of microscopy and rapid diagnostic tests, case management, (type of medication given to confirmed malaria in pregnancy cases), drug efficacy are the other key variables that influence the prevalence of malaria in pregnancy.

FIGURE 2



The above figure indicates some demographic factors (e.g. maternal and gestational age), host factors (gravidity), service factors (diagnostic services, IPT provision, type of treatment), environmental factors (e.g. IRS), and Personal protection factors (ITNs ownership and utilization) that influence the occurrence and prevalence of malaria in pregnancy. HIV infection increases the risk of malaria infection, severe malaria and malaria related mortality.

4.2 CATEGORIES, VARIABLES, AND INDICATORS OF MEASUREMENTS

TABLE 1

CATEGORIES	VARIABLES	INDICATORS
SELECTED INDEPENDENT VARIALES		
Case management	History of MIP	
	Method of diagnosis	Microscopy, RDT, clinical
	Type of drug treatment	Fansidar, quinine, Coartem.
ITNs	Ownership	3 ITNs,2 ITNs,1ITN,0 ITN
	Utilization	Sleeping in ITN the night before the interview.
Catchment area	Mangango,Luampa,and Kaoma catchment area	Residence/ANC attendance.
Intermittent presumptive therapy	High	Three doses
	Medium	Two doses
	Low	Zero or One dose
DEPENDENT VARIABLE		
Malaria in pregnancy	Malaria in pregnancy present	RDT positive
	No malaria in pregnancy	RDT negative

4.3 Study design

The study was cross-sectional in design in which both qualitative and quantitative data were collected

4.4 Study setting and population.

The study was carried out in Kaoma district, 400 km west of Lusaka, the capital of Zambia. The district is the largest of the seven districts in the western province and is the grain basket of the province as it is the main agricultural base.

The district has four hospitals (two mission hospitals, one government hospital, and one military hospital). It has 31 health centres and is predominantly rural. Average distance between health facilities is 60 kilometers.

The district had a total population of 214,417 in 2009. The growth rate was 3.3. The total expected pregnancies were 8,362 in 2009 (CSO, 2000).

The target group of the study was pregnant women, resident and attending ANC services (both static and outreach) in Kaoma district.

Malaria is top cause of morbidity and mortality in the district hence the suitability of this setting for this study.

4.5 Inclusion criteria

Pregnant women attending ANC in Kaoma.

4.6 Exclusion criteria

Non pregnant women.

4.7 Sampling

The district was divided (stratified) into three zones. These divisions (catchment zones) are already in place based on accessibility to first referral services. These are Kaoma District hospital, Luampa mission Hospital, and Mangango mission Hospital catchment areas (zone). Kaoma District Hospital zone has 12 health centers and accounts for 48% of the district population of pregnant women where as Mangango Mission Hospital catchment area has 11 health centers accounting for 31% of the total population of pregnant women in the District. Luampa Mission Hospital has 8 health centers accounting for 21% of the district population of pregnant women. Therefore Kaoma District Hospital zone contributed 192 (48% of the total sample), Mangango Mission Hospital Zone 124 (31% of the total sample), and Luampa Mission Hospital catchment area contributed 84 (21% of the total sample size). The health centers

(clusters) from the three catchment (Zones) areas were selected randomly (cluster sampling) . Consenting and eligible pregnant women found attending antenatal clinic services (both static and outreach) in the selected health facilities were enrolled into the study (convenience sampling). Every fourth pregnant women was selected to be involved in the study was enrolled (systematic sampling).

4.8 Sample Size

Total population of pregnant women was 8362. The sample was calculated as in 4.8.1

4.8.1 Quantitative Sample

To calculate the sample size the following formula was used:

Using EPI-INFO

Population size=8362

Expected frequency =50%

Worst acceptable=45%

Confidence interval 95%

n=360

To allow for non-response the sample was adjusted as follows:

$360/0.90$

Sample size=400

4.8.2 Qualitative sample

Two focus group discussions comprised of 11 and 9 pregnant women. The total sample size for the qualitative sample was 20 respondents.

4.9 Data collection tools and techniques

Both qualitative and quantitative data were collected. Quantitative data was collected through structured interview schedule. Qualitative data was collected through focus group discussions. Data collection was done in three months period.

4.9.1 Data collection tools

The tools that were used to collect data in this study were structured interview schedule, focus group discussion guide and rapid diagnostic tests.

4.9.1.1 Structured interview schedule

This research instrument was used to collect quantitative data. The interview schedule captured information on demographic features, knowledge on malaria in pregnancy and uptake of malaria interventions.

The information on the interview schedule was communicated in the language best understood by a particular participant.

The interview schedule had both closed and open ended questions. The closed ended questions helped capture certain specific and guided responses. The open ended questions permitted the participants to provide responses in their own words and to express themselves

4.9.1.2 Focus Group Discussion

Two focus group discussions were conducted. One focus group discussion (FGDs) comprised 9 pregnant women while the other comprised 11 pregnant women. The proceedings were guided by the researcher and research assistants using the guide. The proceedings of the discussion were recorded. The participants were invited two weeks before the discussion. The day of the focus group discussion coincided with the scheduled day of antenatal care and this avoided inconveniencing the participants.

The researcher, research assistant and recorder introduced themselves. The research team allowed the participants to introduce themselves. The purpose of the focus group discussion was explained in the local language.

The researcher led the discussions using the Focus group discussion guide. Each participant was given an opportunity and time to express their views. The focus group discussion lasted about one hour each.

4.9.1.3 Validity

In order to ensure validity, all the variables under study have been covered in the interview schedule. The questions were clearly constructed to avoid ambiguity. All instruments in this study were pre-tested before the main study commenced to ensure that they captured the required information.

4.9.1.4 Reliability

Reliability of the instrument was evaluated during the pilot study and appropriate adjustments were made.

4.9.1.5 Data collection techniques

In the study Interviews and focus group discussions were used as the main data collection procedures. Data collection was done with the help of trained research assistants in the health centers and hospitals. The RDTs were used to test for malaria antigens in the blood of the participants.

The purpose of the study was explained to the respondents and consent or assent and or permission was sought from them to allow the research team to conduct interviews, RDTs and Focus group discussions.

During the interview, privacy was maintained. Voluntary participation and confidentiality was assured. One person was interviewed at a time in a convenient place. Serial Numbers were indicated on the interview schedules and no names were obtained to promote and assure confidentiality.

Each respondent was interviewed for approximately 15 – 20 minutes. The RDTs results were obtained and feedback to the participant given immediately the results were read. Those with positive RDTs were treated for malaria with an appropriate antimalarial drug.

Each research assistant was asked to interview only up to a maximum of 10 people per antenatal day. This allowed them to concentrate and avoid mistakes due to exhaustion.

For the focus group discussions, a guide was used. Each focus group discussion lasted one hour. The researcher worked with a research assistant, the health facility staff, and a recorder of the proceedings.

4.10 Data quality control

The researcher trained the research assistants (health workers in selected health facilities) on how to collect the required data and do RDTs. The instruments were pre-tested before they were used in the field. Data collected was cleaned and edited while in Kaoma to determine completeness, consistency and uniformity. This was achieved by going through all the questionnaires immediately from the field with each research assistant.

4.11 Pilot study (pretest)

The pilot Study was done at Kaoma urban and Mulamba clinics in Kaoma district. The two clinics were chosen because they are representative of the population composition of the pregnant women in Kaoma. They are also reachable without much cost in terms of transport.

The pilot study was useful in testing validity and reliability of the research instruments. It also helped to determine the best time to collect data and the duration of each interview. Only 40 participants were interviewed during the pilot study. The participants were selected by convenience sampling method. One focus group discussion was conducted. The respondents for focus group discussion were conveniently sampled. Effort was made to ensure that the group was homogenous in terms of age, socio economic status, marital status and educational level.

4.12 Data processing and analysis.

The closed ended responses were coded to ensure easy entry and analysis of data when using a computer. The open ended responses were assigned codes to bring related issues together under themes. The quantitative data were entered with EpiData and analysis was done using SPSS 17.0.

The Chi-Square test was used to test for association between variables.

The confidence interval was set at 95%. A result yielding a P value of less than 5% was considered to be statistically significant.

Qualitative data was analyzed with content analysis. A report of the proceedings of the FGDs was prepared. Some participants own words were recorded and reflected, the key statements, ideas and attitudes expressed were included in the report.

The results and findings were interpreted and the most useful quotation that emerged from the discussions to illustrate the main ideas was selected. The data summary was done with the use of narratives

CHAPTER 5

5.0: PRESENTATION AND DATA ANALYSIS

5.1: INTRODUCTION

Data coding, checking, and cleaning were done before entry into EpiData file. Data analysis was done with SPSS 17.0. The P value of 0.05 was used to determine significance of findings. The data and findings presented were obtained from 404 pregnant (participants) women attending antenatal care in 13 health facilities in Kaoma district. Data was collected over a three months period (November, and December, 2009 and January 2010). 380 participants were tested with RDT for malaria in pregnancy.

5.2: PREVALENCE OF MALARIA IN PREGNANCY

380 participants were tested for malaria with RDTs representing a testing rate of 94%.

46 participants (12%) were reactive to RDTs. The prevalence therefore was 12%.

5.3: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

5.3.1: INTRODUCTION

The socio-demographic features that were evaluated were age, marital status, education status and level, employment status, household size, religion, parity, and number of pregnancies.

5.3.1.1: AGE

Table 2 shows that majority of respondents were young pregnant women aged between 19-23 years (26.5%) followed by those aged between 24-29 years (22.8%) and the least number were those aged 35 years and above.

TABLE 2: AGE OF RESPONDENTS

Age range	N	(%)
<=18	79	19.6
19 - 23	107	26.5
24 - 29	92	22.8
30 - 35	88	21.8
>35	38	9.4
Total	404	100.0

5.3.1.2: MARITAL STATUS

Table 3 shows that the majority (61.6%) of the participants were married women.

TABLE 3: MARITAL STATUS OF RESPONDENTS

status	N	(%)
Single	155	38.4
Married	249	61.6
Total	404	100.0

5.3.1.3: EDUCATION STATUS

Table 4 shows that among participants 309 (76.6%) have been to school, 95 (23.5% have never attended any formal school education. Table 5 shows that two (0.5%) participants had reached tertiary education and 86 (21.3%) had reached secondary school education.

TABLE 4: EDUCATION STATUS OF RESPONDENTS

Attend ed school	N	(%)
Yes	309	76.5
No	95	23.5
Total	404	100.0

TABLE 5: EDUCATION LEVEL OF RESPONDENTS

Educatio n level	N	(%)
Primary	221	54.7
Secondary	86	21.3
College	2	.5
none	95	23.5
Total	404	100.0

5.3.1.5: EMPLOYMENT STATUS

Table 6 shows that only 6 participants (1.5%) were in formal employment while the rest 398 (98.5%) were not in informal employment and earned their living largely through subsistence farming. This indicates that unemployment levels and consequently poverty levels were high among the participants.

TABLE 6: EMPLOYMENT STATUS OF RESPONDENTS

Status	N	(%)
Unemployed	398	98.5
Employed	6	1.5
Total	404	100.0

5.3.1.6: SIZES OF HOUSEHOLDS OF PARTICIPANTS

Table 7 shows that the majority of households of the respondents were large and the 3 ITNs per household target is not adequate for all household members.

TABLE 7: SIZE OF HOUSE HOLDS OF PARTICIPANTS

Household size	N	(%)
=<2	49	10.9
3 - 5	183	45.3
6 - 10	175	39.9
>10	16	4.0
Total	404	100

5.3.1.7: RELIGION

Table 8 shows majority of participants were liberal Protestants (82.1%) followed by Catholics (9.2%) while the rest were either strict protestant or other.

TABLE 8: RELIGIOUS DENOMINATION OF PARTICIPANTS

Denomination	N	(%)
Catholic	37	9.2
Liberal protestant	332	82.1
Strict protestant	12	3.0
Other	23	5.7
Total	404	100.0

5.3.1.8: PARITY OF PARTICIPANTS

Table 9 shows that majority of participants had given birth before 297(74.1%) while the primigravidae were 105 (25.9%).

TABLE 9: PARITY OF PARTICIPANTS

Given birth before	N	(%)
Yes	299	74.1
No	105	25.9
Total	404	100.0

5.3.1.9: GRAVIDITY OF RESPONDENTS

Table 10 shows that majority of respondents were grand multiparae 124 (28.5%) followed by primigravidae 106 (26.2%).

TABLE 10

gravidity	n	(%)
Primigravidae	106	26.2
gravidae two	63	15.6
gravidae three	62	15.3
gravidae four	58	14.3
grand multiparae	124	28.5
Total	404	100

5.4: CROSS TABULATIONS

5.4.1: Introduction

The factors that were cross tabulated are:

- 1) Catchment area (zone) and malaria in pregnancy
- 2) Maternal age and malaria in pregnancy
- 3) Number of pregnancies and malaria in pregnancy.
- 4) Gestational age and malaria in pregnancy
- 5) ITN ownership and malaria in pregnancy.
- 6) ITN utilization and malaria in pregnancy.
- 7) Indoor residual spraying and malaria in pregnancy
- 8) Number of doses of IPT and malaria in pregnancy.

Case management

- 9) Previous episode of malaria illness (in the current pregnancy) and malaria in pregnancy
- 10) Method of diagnosis of malaria illness (in the current pregnancy) and malaria in pregnancy.
- 11) Type of treatment (drug) in previous episode of malaria illness and malaria in pregnancy.

5.4.2: ASSOCIATION BETWEEN CATCHMENT AREA (ZONE) AND MALARIA IN PREGNANCY

Table 11 shows that the majority of RDT positive participants (47.8%) were those residing and attending antenatal care (both static and outreach) in Mangango catchment area (zone) followed by those in Luampa catchment area (32.6%). The least number of positives came from Kaoma catchment area (19.6%). The highest percentage of RDT positives were from Mangango catchment area (Zone). The p value is less than 0.05 and hence the finding is statistically significant. Therefore this observation could not have occurred by chance. There was association between catchment area of residence and ANC attendance (both static and outreach) and malaria in pregnancy.

TABLE 11: CATCHMENT AREA AND MALARIA IN PREGNANCY

			Result of RDT		Total
			Positive	Negative	
Zone	Kaoma	N (%)	9 (19.6%)	182 (54.5%)	191 (50.3%)
	Mangang	N (%)	22 (47.8%)	46 (13.8%)	68 (17.9%)
	Luampa	N (%)	15 (32.6%)	106 (31.7%)	121 (31.8%)
Total		N (%)	46 (100%)	334 (100%)	380 (100%)

Chi-square 36.02 p 0.001

5.4.2: ASSOCIATION BETWEEN MATERNAL AGE AND MALARIA IN PREGNANCY

Table 12 shows that the majority of RDT positive participants were aged between 19- 23 years followed by those aged 24-29 years and 18 years or below. The least number of RDT positives were among those aged above 35 years. Malaria was therefore more common in younger mothers. The P value was greater than 0.05 and hence the finding is not statistically significant indicating that this observation could have occurred by chance. In this study there is no significant association between maternal age and malaria in pregnancy.

Table 12: MATERNAL AGE AND MALARIA IN PREGNANCY

AGE INTERVAL	Result of RDT		Total
	Positive	negative	
Age<= 18 yrs N (%)	8 (17.4%)	67 (20.1%)	75 (19.7%)
19-23 (N) (%)	16 (34.8%)	85 (25.4%)	101 (26.6%)
24-29yrs N (%)	12 (26.1%)	73 (21.9%)	85 (22.4%)
30-35 N (%)	8 (17.4%)	73 (21.9%)	81 (21.3%)
>35yrs N (%)	2 (4.3%)	36 (10.8%)	38 (10.0%)
Total N (%)	46 (100%)	334 (100%)	380 (100%)

Chi-square 3.84 p 0.427

5.4.3: ASSOCIATION BETWEEN NUMBER OF PREGNANCIES AND MALARIA IN PREGNANCY

The majority of RDT positives (malaria in pregnancy cases) were gravidae two (10) followed by primigravidae (9) and the least were gravidae 12 with one. Therefore malaria in pregnancy is more common among gravidae two and gravidae one. The p value is greater than 0.599 and is not statistically significant. The observation that malaria in pregnancy was more common in primigravidae and gravidae 2 could have occurred by chance. In this study the number of pregnancies (gravidity) was found not to be significantly associated with malaria in pregnancy

TABLE 13: NUMBER OF PREGNANCIES AND MALARIA IN PREGNANCY

RDT	N	Mean	Std. Deviation	F	Sig.
Positive	46	3.63	2.628	.278	.599
Negative	331	3.44	2.317		
Total	377	3.46	2.354		

P 0.599

5.4.4: ASSOCIATION BETWEEN GESTATION AGE AND MALARIA IN PREGNANCY.

The majority of RDT positive participants were in their second trimester (4 to 6 months of gestation) of pregnancy followed by those in the first trimester (1 to 3 months). In 2nd trimester, the majority of RDT positives clients were in 5th month of pregnancy followed by those in 6th month of pregnancy while the least were in 4th month of gestation. The p value was less than 0.05 and therefore it is statistically significant. This indicates that there is a significant association between gestational age and malaria in pregnancy.

TABLE 14: GESTATION AGE AND MALARIA IN PREGNANCY

	N	Mean	Std. Deviation	F	Sig.
Positive	45	5.28	1.679	10.586	.001
Negative	329	6.22	1.826		
Total	374	6.10	1.833		

Sum of squares 34.66, p 0.001

5.4.5 ASSOCIATION BETWEEN ITN OWNERSHIP AND MALARIA IN PREGNANCY:

Table 15 shows that 27 (58.7%) of the RDT participants owned at least one net. Among this group, the majority of RDT positive (70.4%) participants were those who owned one ITN only in their households followed by those (18.5%) with two ITNs in their household. The least number of RDT positives (3.7%) were those with three ITNs in their households. Those RDT positive participants with four ITNs accounted for 7.4% of the RDT positives with ITNs. The fewer the number of ITNs the more the malaria cases. The p value is 0.290 and therefore is not statistically significant. This shows that this observation could have occurred by chance and that there is no significant association between ITN ownership and malaria in pregnancy.

TABLE 15:NUMBER OF ITNs AND MALARIA IN PREGNANCY

		Result of RDT		Total	
		Positive	Negative		
Number of ITN that you own	1	N	19	143	162
		(%)	(70.4%)	(73.7%)	(73.3%)
	2	N	5	38	43
		(%)	(18.5%)	(19.6%)	(19.5%)
	3	N	1	10	11
		(%)	(3.7%)	(5.2%)	(5.0%)
	4	N	2	3	5
		(%)	(7.4%)	(1.5%)	(2.3%)
Total	N	27	194	221	
	(%)	(100%)	(100%)	(100%)	

Chi-square 3.74 p 0.290

5.4.6: ASSOCIATION BETWEEN ITN UTILISATION (SLEEPING IN ITN THE NIGHT BEFORE THE INTERVIEW) AND MALARIA IN PREGNANCY.

Table 16 shows that 26 participants (56.5%) who were RDT positive slept in an ITN the night before the interview. It shows that the majority of the RDT positive participants slept in an ITN the night before the interview. It implies that of the 27 RDT positive participants who had ITNs 26 (96.2%) slept in an ITN the night before. This means that when people have ITNs they utilize them and the major reason why people don't sleep in ITNs is because they do not have them. The p value is greater than 0.05 and is not statistically significant. The result that more RDT positive participants slept in ITNs the night before the interview could have occurred by chance. In this study there is no significant association between sleeping in an ITN the night before the interview and malaria in pregnancy

TABLE 16:ITN UTILISATION AND MALARIA IN PREGNANCY

		Result of RDT		Total	
		Positive	Negative		
Slept in ITN last night	Yes	N (%)	26 (56.5%)	181 (54.4%)	207 (54.6%)
	No	N (%)	20 (43.5%)	152 (45.6%)	172 (45.4%)
Total		N (%)	46 (100%)	333 (100%)	379 (100%)

Chi-square p 0.782

5.4.7: ASSOCIATION BETWEEN INDOOR RESIDUAL SPRAYING AND MALARIA IN PREGNANCY:

Table 17 shows that only 10 (22.2%) of the RDT positive participants had their houses sprayed against mosquitoes indicating that the coverage of indoor residual spraying was 22.2% among the RDT positive participants. The majority (77.8%) of RDT positive participants came from households where indoor residual spraying was not done. The p value is greater than 0.05 and therefore is not statistically significant. This observation that there were more RDT positives among those, whose houses were not sprayed against mosquitoes, could have occurred by chance. There is therefore in this study, no significant association between indoor residual spraying and malaria in pregnancy.

TABLE 17:IRS AND MALARIA IN PREGNANCY

		Result of RDT		Total	
		Positive	Negative		
House was sprayed against mosquitoes	Yes	N (%)	10 (22.2%)	114 (35.2%)	124 (33.6%)
	No	N (%)	35 (77.8%)	210 (64.8%)	245 (66.4%)
Total		N (%)	45 (100%)	324 (100%)	369 (100%)

Chi-square 2.97 p 0.085

5.4.8: ASSOCIATION BETWEEN NUMBER OF DOSES OF IPT AND MALARIA IN PREGNANCY.

Table 18 shows that 26 (56.5%) of the RDT positive participants took fansidar as intermittent presumptive therapy. The coverage of intermittent presumptive therapy was therefore 56.5% among the RDT positive participants. It also shows that the majority i.e.17 (65.4%) of RDT positive participants who took IPT are those who had only taken one dose of sulfadoxine-pyrimethamine (fansidar) followed by those who took two doses i.e. 8 (30.8%). Those who took three doses were the least i.e. 1(3.8%). The p value is less than 0.05 and it is statistically significant, hence the observation could not have occurred by chance. Therefore there is a significant association between the number of doses of intermittent presumptive therapy (IPT) taken and malaria in pregnancy. The higher the number of doses of IPT the less the occurrence the malaria in pregnancy.

Table 18: NUMBER OF IPT DOSES AND MALARIA IN PREGNANCY

		Result of RDT		Total
		Positive	Negative	
Doses of Fansidar in 1 IPT	N (%)	17 (65.4%)	81 (43.5%)	98 (46.2%)
	2 (%)	8 (30.8%)	64 (34.4%)	72 (34.0%)
	3 (%)	1 (3.8%)	41 (22.0%)	42 (19.8%)
Total	N (%)	26 (100%)	186 (100%)	212 (100%)

Chi-square 6 p 0.044

5.4.9: ASSOCIATION BETWEEN CASE MANAGEMENT AND MALARIA IN PREGNANCY

5.4.9.1: ASSOCIATION BETWEEN PREVIOUS EPISODE OF MALARIA PREGNANCY (SAME PREGNANCY) AND MALARIA IN PREGNANCY

Table 19 shows that 24 (52.2%) of the RDT positive participants stated that they had not suffered from malaria before in the current pregnancy, while 22 (47.8%) had suffered from malaria illness in the current pregnancy. Therefore the majority of the RDT positive participants are those who had not had a previous episode of malaria in pregnancy in the current pregnancy.

The p value is less 0.05 and the result is statistically significant. Therefore the result could not occur by chance. There is a significant association between previous episode of malaria illness in the same pregnancy and another episode of malaria in pregnancy. A previous episode of malaria (as reported by pregnant women) in the same pregnancy is likely not to have another episode of malaria in pregnancy. Repeat episodes of malaria illness in the same pregnancy less likely to happen.

TABLE 19: PREVIOUS EPISODE OF MALARIA AND MALARIA IN PREGNANCY

		Result of RDT		Total	
		Positive	Negative		
Has suffered from malaria in this pregnancy	Yes	N (%)	22 (47.8%)	84 (25.1%)	106 (27.9%)
	No	N (%)	24 (52.2%)	250 (74.9%)	274 (72.1%)
Total		N (%)	46 (100%)	334 (100%)	380 (100%)

Chi-square 10.33, p 0.001

5.4.9.2: ASSOCIATION BETWEEN DIAGNOSTIC METHOD IN PREVIOUS EPISODE OF MALARIA IN THE CURRENT PREGNACY AND MALARIA IN PREGNANCY

Table 20 shows that 28 RDT positive participants stated the method of diagnosis used in the previous episode of malaria illness in the current pregnancy.

Majority (60.7%) of RDT positive participants with history of previous episode of malaria in pregnancy are those whose previous malaria illness was diagnosed through either microscopy or RDT (confirmed cases). The p value is less than 0.05 and is therefore statistically significant. The observation that there were more RDT positives among those whose previous illness was confirmed by microscopy or RDTs could not have occurred by chance.

Therefore microscopy or RDT diagnosis (confirmed) in previous episode of malaria (same pregnancy) is associated with another episode of malaria in pregnancy. This means that confirmed cases of malaria (true malaria patients) are more likely to have another episode of malaria in pregnancy in the same pregnancy.

Repeat episodes of confirmed malaria (confirmed by either microscopy or RDTs) are more likely to reoccur.

TABLE 20: DIAGNOSTIC METHOD IN PREVIOUS MALARIA EPISODE AND MALARIA IN PREGNANCY.

			Result of RDT		Total
			Positive	Negative	
Diagnosis clinically	Yes	N (%)	11 (39.3%)	61 (75.3%)	72 (66.1%)
	No	N (%)	17 (60.7%)	20 (24.7%)	37 (33.9%)
Total		N (%)	28 (100%)	81 (100%)	109 (100%)

Chi-square 12.04 p 0.001

N.B: Table 20 and table 21 show that the number of those who suffered from previous episode of malaria in the same pregnancy is less than those who underwent diagnostic evaluation for the

malaria illness. This is because some participants could not remember or did not know that they had malaria in the current pregnancy. The information was however got from the antenatal card or patients records (book).

5.4.9.3: ASSOCIATION BETWEEN TYPE OF TREATMENT GIVEN IN PREVIOUS MALARIA EPISODE (CURRENT PREGNANCY) AND MALARIA IN PREGNANCY:

Table 21 shows that 27 out of 28 i.e. (96.4%) RDT positive participants who had a malaria episode in the current pregnancy were treated for the malaria episode. Accessibility to treatment was therefore high. Majority i.e.20 (74.1%) were treated with fansidar in previous malaria episode in the current pregnancy. However those RDT positives that were treated with quinine were fewer i.e.7 (25.9%).This means that those treated with fansidar in the previous episode of malaria in current pregnancy are more likely to have another episode of malaria in pregnancy than those treated with quinine. Repeat episodes of malaria illness in the same pregnancy are more likely to occur with fansidar treatment.

The p value is less than 0.05 and therefore is statistically significant. Therefore the type of treatment (drug) in the previous episode of MIP (same pregnancy) is associated with malaria in pregnancy.

TABLE 21:TYPE OF TREATMENT AND MALARIA IN PREGNANCY

			Result of RDT		Total
			Positive	Negative	
Treatment given	Fansidar	N (%)	20 (74.1%)	46 (59.0%)	66 (62.9%)
	Quinine	N (%)	7 (25.9%)	12 (15.4%)	19 (18.1%)
	Panadol	N (%)	0 (.0%)	17 (21.8%)	17 (16.2%)
	Can remember	N (%)	0 (.0%)	3 (3.8%)	3 (2.9%)
Total		N (%)	27 (100%)	78 (100%)	105 (100%)

Chi-square 8.88 p 0.031

TABLE 22: SUMMARY OF VARIABLES, P VALUES AND THEIR STATISTICAL SIGNIFICANCE

Dependent variable	Independent variable	P value	Statistical significance
Malaria in pregnancy	Zone(catchment area)	0.001	Significant
	Maternal age	0.427	Not significant
	Number of pregnancies	0.599	Not significant
	Gestational Age	0.001	Significant
	ITN ownership	0.290	Not significant
	ITN Utilization	0.782	Not significant
	Number of doses of IPT	0.044	Relatively Significant
	Previous episode of Malaria in current pregnancy	0.001	Significant
	Diagnostic method in previous episode of MIP.	0.001	Significant
	Type of treatment (drug) taken in previous MIP.	0.031	Significant
	IRS	0.085	Not significant

5.5: QUALITATIVE FINDINGS OF THE STUDY

Two focus group discussions were conducted at Kaoma District Hospital and Mangango Mission Hospitals respectively on 29th January 2010.

At Kaoma District Hospital there were nine (9) respondents while at Mangango Mission Hospital they were eleven (11) respondents. The total sample was 20 participants.

The participants described malaria as a disease which causes various symptoms and complications. "It makes one feel very ill and some patients even die. Many people can be sick of malaria at the same time in one family or community at the same time".

The participants perceived malaria causation as associated with mosquito bites. "It is caused by being bitten by mosquitoes for a long time. If bitten once then you cannot get malaria" agreed the participants.

Participants further stated that malaria can be caused by not taking good care of water sources, dirty, and tall grass in the surroundings. "It can be caused by eating dirty food and not having good nutrition, and having an enlarged spleen".

Participants also stated that malaria can also be caused by swimming in the river, being soaked by the rains, and eating unripe sweet/sugar canes.

It was apparent that causation of malaria among the participants is associated with various myths.

On transmission of malaria participants stated that malaria can be transmitted from one person to another.

"Malaria is transmitted when mosquitoes bite sick people and go to bite people who are not sick." Respondents stated that malaria can also be transmitted through air by living with a person who has malaria. It became clear that while the participants knew that transmission of malaria is through mosquito bites there was limitation in biomedical knowledge and transmission is associated with several myths.

Participants mentioned pregnant women, unborn child (fetus), children under the age of five years, breastfeeding mother and children, elderly people and chronically ill patients are most vulnerable to malaria.

The following are the ways in which respondents thought that malaria can be prevented in pregnant women.

- Sleeping in a treated mosquito net
- Taking intermittent presumptive therapy.
- Indoor residual spraying.
- Not eating leftover food
- Burying pools of water, empty tins, and tires
- Clearing the surroundings

The participants stated activities being undertaken by the ministry of health and partners in their communities such as health education, distribution of ITNs, and provision of indoor residual spraying in selected places and drugs in health facilities.

Participants stated that pregnant women appreciate these interventions and travel long distances to the health facilities to attend ANC and get IPT. However some pregnant women don't have ITNs, while some households use ITNs for fishing. "The ITNs are not enough during distribution one ITN is given to a house hold which can be as large as eight people (8)."

Respondents suggested at least four (4) ITNs per house to be given out during ITN distribution exercise. They further suggested that when ITNs are being distributed, the size of house hold, number and age /sex of children should be taken into consideration.

The respondents stated the following as the reasons which make some women to not access the malaria interventions:

- Late registration for ANC (Booking due long distances).
- Lack/inadequate ANC attendance by some pregnant women.
- Abuse of ITNs such as fishing.
- Inadequate understanding of the importance of ANC among women.
- Long distances to the health facility from communities and insufficient outreach sessions.
- Inadequate human resource in the community and health facilities (CHVs, Nurses, etc).
- Inadequate or stock outs medical and other supplies (fansidar, RDTs, ITNs)
- Only selecting few areas for indoor residual spraying, spraying during the rainy season, and not fulfilling appointments for spraying.

The respondents stated that drugs for IPT (fansidar) and general malaria treatment are available at health facilities. However there are no drugs or RDTs at the primary health care posts in the communities. This entails walking long distances have to access treatment and malaria testing.

Respondents stated that patients therefore resort to use of herbs such as Sinunkenunke leaves, mumbomba leaves, Mupulanga leaves, Mululwe leaves, paw paw leaves and kamengo leaves to treat malaria illness. The leaves are boiled and patients are covered for steaming or the medicine is taken orally.

Respondents stated that some pregnant women do not sleep in ITNs due to:

- Majority of pregnant women do not have in ITNs.
- Sleeping in an ITN when only one hears mosquitoes.
- Too hot to sleep in an ITN.
- Difficulties in breathing while sleeping in ITNs.
- When attending funerals or visiting relatives pregnant women do not sleep ITNs as it is culturally not acceptable
- ITNs given to children.

While participants were willing to have their houses sprayed it was not clear to them why only some areas are selected for IRS. Participant so stated that the chemicals for IRS are only effective for about two weeks there after which they expire. “While other insects die, mosquitoes survive in the houses though they reduce in number”. The respondents complained that the chemical causes itching and rash.

The respondents stated that the chemicals for IRS could be dangerous for pregnant women and new born babies.

According to the focus group participants malaria is associated with the poor coverages of the malaria control interventions, widely distributed in their community and common among the pregnant women

CHAPTER 6

DISCUSSION OF RESULTS

6.0: INTRODUCTION

A cross-sectional study was conducted to determine the prevalence, pattern of distribution (geographical) and factors associated with malaria in pregnancy in Kaoma district. The study consisted of 405 pregnant women attending ANC (both static and outreach) in the 13 health facilities in the district. However 404 pregnant were interviewed giving a response rate of 99.8%. 380 participants were tested with RDTs giving a testing rate of 94%. Two focus group discussions were held at two health facilities to complement results from the quantitative component of the study. The focus group discussion at Mangango consisted of 11 participants while at Kaoma they were 9 participants.

6.1: PREVALENCE OF MALARIA IN PREGNANCY

Prevalence in this study was defined as the number of pregnant women (attending ANC both static and outreach) that had a positive RDT reaction divided by the total number of women tested for malaria multiplied by 100.

PREVALENCE: $46/380 \times 100 = 12\%$

This prevalence is higher than the prevalence of *p.falciparum* as revealed by the study conducted by Chanda et al (2007) which revealed a *p.falciparum* prevalence of 6.9% among pregnant women attending ANC in Zambia.

It is higher than the prevalence as revealed by the study conducted by Chimere.O.Agomo et al (2009) which revealed a prevalence of 7.7% in south-west Nigeria. The prevalence of malaria in pregnancy is variable.

6.2: ASSOCIATION BETWEEN CATCHMENT AREA AND MALARIA IN PREGNANCY

There was an association between catchment area (Zone) and malaria in pregnancy. There were more malaria in pregnancy cases in Mangango catchment followed by Luampa and the least in Kaoma. This agrees with the annual health information reports in 2007 that showed highest incidence of malaria in Kaoma across all age groups is in Mangango catchment area.

6.3: ASSOCIATION BETWEEN MATERNAL AGE AND MALARIA IN PREGNANCY

There was no association between maternal age and malaria in pregnancy. This finding contradicts the findings of the study by Chimere O.Agomo et al, 2009 in south-west Nigeria which showed that young maternal age (age less than 20 years) is associated with malaria in pregnancy. It also contradicts the findings of the study by Marie le et al, 2003 which showed that malaria in pregnancy was higher in pregnant women below 20 years of age followed by those above 35 years of age.

6.4: ASSOCIATION BETWEEN NUMBER OF PREGNANCIES AND MALARIA IN PREGNANCY

There was no association between number of pregnancies and malaria in pregnancy. This observation contradicts the results of the study by J.Chipeta et al (2007) which showed that primigravidae were more susceptible to pregnancy associated malaria than their multigravidae counterparts in Zambia.

6.5: ASSOCIATION BETWEEN GESTATIONAL AGE AND MALARIA IN PREGNANCY.

The association between gestational age and malaria in pregnancy was found to be significant. Majority of malaria in pregnancy cases (RDT positives) were in their second trimester, followed by those in second trimester and least in third trimester. This finding agrees with several data that show the second trimester of pregnancy is a risk factor of malaria in pregnancy.

6.6: ASSOCIATION BETWEEN OWNERSHIP OF INSECT TREATED NETS OWNERSHIP AND MALARIA IN PREGNANCY.

The highest number of malaria cases (RDT positives) was among those with no ITNs, one ITN, followed by those who had two ITNs, and least among those with three ITNs.Those with four ITNs were third highest in number. This association between insect treated nets ownership and malaria in pregnancy was not significant. There was no significant association between number of owned ITNs and malaria in pregnancy.

6.7: ASSOCIATION BETWEEN ITN UTILISATION AND MALARIA IN PREGNANCY

The study found that there was no association between ITN utilization and malaria in pregnancy. This finding agrees with data and several studies which show that protective efficacy of ITNs alone is low. A study by Bentlinger et al (2006) showed that the protective efficacy of ITNs alone is 41.6% in primigravidae versus 55.8% for a combination of ITNs and at least two doses of IPT. During the focus group discussions participants stated that it is not possible to sleep in an ITN every day.

6.8: ASSOCIATION BETWEEN NUMBER OF IPT DOSES TAKEN AND MALARIA IN PREGNANCY.

There was association between the number of intermittent presumptive therapy doses and malaria in pregnancy. The number of RDT positives (malaria in pregnancy) was highest among those participants who took zero or one dose of intermittent presumptive therapy and least among those who took three doses. The higher the number of intermittent presumptive therapy doses the less the likelihood of having malaria in pregnancy.

This finding is supported by several studies one of which was done in Kenya and demonstrated that a three dose intermittent presumptive therapy (IPT) regimen is more effective than a two dose regimen in pregnant women. (Alilio et al, 2004)

6.9: ASSOCIATION BETWEEN PREVIOUS EPISODE OF MALARIA ILLNESS (IN THE CURRENT PREGNANCY) AND MALARIA IN PREGNANCY.

In the study there was more malaria in pregnancy cases (RDT positives) among those who did not report a previous episode of malaria illness in the same pregnancy. There was association between reporting of previous episode of malaria illness in the current pregnancy and RDT positivity (malaria in pregnancy). Those pregnant women who reported a previous episode of illness were less likely to have another episode of malaria in pregnancy. This finding should be interpreted with caution as some malaria illness in pregnancy presents as asymptomatic.

6.10: ASSOCIATION BETWEEN PREVIOUS CLINICAL DIAGNOSIS OF MALARIA ILLNESS (IN THE SAME PREGNANCY) AND MALARIA IN PREGNANCY.

There was association between the type of diagnosis (clinical or microscopy/RDT) in previous episode of malaria and malaria in pregnancy. There was more malaria in pregnancy cases (RDT positive) among those whose previous malaria illness was confirmed either by microscopy or RDT. This means a confirmed episode of malaria illness in pregnancy is likely to reoccur. This entails that health education, personal protection and appropriate case management should be strengthened in malaria in pregnancy confirmed cases.

6.11: ASSOCIATION BETWEEN TYPE OF ANTIMALARIA DRUG GIVEN AND MALARIA IN PREGNANCY.

The study found that there was no statistically significant association between the type of antimalarial drug taken in previous episode of malaria illness (in the current pregnancy) and malaria in pregnancy as 74.1% of the RDT positives were those previously treated with fansidar compared with 25.9% for those previously treated with quinine. This implies that the efficacy sulfadoxine-pyrimethane (fansidar) in treatment of malaria in pregnancy is less than that of quinine. This may be a sign that fansidar resistance has developed in Kaoma.

6.11: ASSOCIATION BETWEEN IRS AND MALARIA IN PREGNANCY

The study found that there was no statistically significant association between indoor residual spraying and malaria in pregnancy. There was more malaria in pregnancy cases from areas where indoor residual spraying was not done than those where it was done. The coverage of indoor residual among houses of RDT positive participants was low (32.2%). The statistically insignificant association contradicts the finding of the evaluation results of the malaria control program by indoor residual spraying in Chingola and Chililabombwe, Copper belt province of Zambia which showed a significant reduction in prevalence of malaria after indoor residual spraying was done (Brian sharp et al, 2002)

6.13 CONCLUSIONS

The prevalence of Malaria in pregnancy among pregnant women attending antenatal care (both static and outreach) in thirteen health facilities in Kaoma district was found to be 12% (approximately 1 in every 8). Mangango catchment area was associated with the highest proportion of the malaria in pregnancy cases. Malaria in pregnancy in Kaoma district was found to be associated with gestational age (2nd trimester, 6th month of pregnancy), no or lower number IPT doses (particularly only one dose). Other factors associated with malaria in pregnancy are a previous episode of confirmed (by microscopy or RDT) malaria illness and use of fansidar to treat malaria in pregnancy.

6.14 RECOMMENDATIONS

- 1) The high prevalence of malaria in pregnancy in Kaoma district and Mangango catchment area requires intensified implementation of the malaria control interventions. It requires that testing for malaria in pregnancy should be routinely done during antenatal care clinics both at static and outreach stations. Malaria testing should also be rolled out to the community level (community health workers) to ensure that pregnant women can access the services as close to their family as possible.
- 2) The coverage of all the key malaria interventions in the district was found to be below 80% among the participants in the study. To address this Kaoma district requires support from the government and other co-operating partners. The provision of the recommended three doses of intermittent presumptive therapy among pregnant women needs to be prioritized and increased.
- 3) There is need to ensure that all malaria illness in pregnant women is confirmed with either microscopy or RDTs. Those found positive for malaria should be provided with adequate health education, and protective measures (ITNs) to avoid repeat episode of malaria illness in the same pregnancy.
- 4) The repeat of malaria in pregnancy episodes after treatment with fansidar may indicate emergence of drug resistance. It entails that the treatment guidelines of malaria in pregnancy need review. Research is required to determine the efficacy of fansidar in the treatment of malaria in pregnancy especially with the advent of HIV/AIDS pandemic.

6.13: DISSEMINATION OF FINDINGS

The researcher first presented the findings to the faculty in the department of community medicine. The results were also communicated to Kaoma District Medical Office, Provincial Medical Office, and Ministry of Health, Lusaka and the National Malaria Control Centre.

One copy is displayed and placed in the Medical library, and the other at the main library at UNZA great East Road Campus.

The researcher hopes to publish the findings in one of the Medical journals.

6.14: LIMITATIONS OF THE STUDY

This Cross sectional study captured information at one point in time and hence cannot depict trend analysis to determine contributing factors to the prevalence of malaria in pregnancy in Kaoma district.

The study recruited pregnant women attending antenatal clinics (static and outreach) in selected health facility. Several factors influence antenatal attendance such as proximity and accessibility to health facility. The study results may not represent the entire district.

Malaria is a seasonal disease and therefore its prevalence varies according to seasons. The study was carried out during the peak transmission season in Zambia i.e. November to March.

However, even with such limitations this study was useful in that the information obtained will assist Kaoma district medical office to plan for more effective implementation and scaling up of key interventions in the control, and prevention of malaria.

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8.0 APPENDICES

APPENDIX I

INFORMED CONSENT FORM

Research Ethics Committee

- § Biomedical Research Ethics Committee
- § Ridgeway Campus, P.O Box 50110, Lusaka, Zambia
- § Tel : 256067

Researcher

- § Name: Simulyamana Choonga Aspha
- § Address: Provincial Medical Office,
- § PO Box 910022, Mongu, Western province
- § Phone: 0955120534, 0977120534, 0967120534

Thank you for agreeing to participate in this study which will take place from November 2009 to December 2010.

This form outlines the purposes of the study and provides a description of your involvement and rights as a participant.

The purposes of this study are:

- 1) To fulfill a course requirement for Masters in Public health at the University of Zambia
- 2) To gain insight and experience in the topic of prevalence of malaria in pregnancy in Kaoma district.

The methods to be used to collect information for this study are explained below. From this information, we will write a report about the prevalence of malaria in pregnancy and how to prevent it.

You are encouraged to ask any questions at any time about the nature of the study and the methods that will be used. Your suggestions and concerns are important to the research team and please contact me at any time at the address or phone number mentioned above.

I will use the information from this study to write a report .The report will be available to any person to be read from the University of Zambia Library.

I guarantee that the following conditions will be met:

- 1) Your real name will not be used at any point of information collection, or in the written report; instead, you and other participants involved will be given numbers that will be used in all verbal and written records and reports.
- 2) Your participation in this research is voluntary; you have the right to withdraw at any point of the study, for any reason, and without any prejudice, the information collected, records and reports written will be turned over to you.
- 3) The relevant sections of data collected during the study will be looked at by responsible individuals from, regulatory authorities, where it is relevant to your taking part in this research. I give permission for these individuals to have access to my records.

I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. Therefore I agree to the terms and grant permission to be quoted directly? I agree to the terms

Respondent _____ Date _____

Researcher _____ Date _____

APPENDIX II

STRUCTURED INTERVIEW SCHEDULE

TOPIC:

PREVALENCE OF MALARIA IN PREGNANCY IN KAOMA DISTRICT

DATE OF INTERVIEW:

PLACE OF INTERVIEW:

NAME OF INTERVIEWER:

SERIAL NUMBER (of respondent):

INSTRUCTIONS TO THE INTERVIEWER

Introduce yourself to the respondent.

Explain the reason for the interview.

Assure the respondent of confidentiality and voluntary participation.

Write only the serial number and not the name of the respondent on the questionnaire.

Clearly Tick or Circle the response to the question or fill in the blank spaces provided.

Thank each respondent at the end of the interview.

Provide time to the respondent to ask questions at the end of the interview

SECTION A: DEMOGRAPHIC DATA

How old were you last birthday?

Marital status

1. Single
2. Married
3. Divorced
4. Separated
5. Widowed
6. Other specify

c) Have you ever attended school?

- 1) Yes
- 2) No

d) What is the highest Educational level you have attained?

1. None
2. Primary
3. Secondary
4. Other specify

e) What is your occupation?

1. Unemployed
2. Farmer
3. Self employed
4. Formally employed
5. Other specify

f) Number of people in your household

.....

g) Religious Denomination

.....

h) How you ever given birth in your life?

1) Yes

2) No

i) If yes, how many times?

.....
.....

j) Have you ever had any of the following conditions in your reproductive life?

1) Abortion(s)

2) Still births

3) Neonatal death

4) Infant deaths

5) Other specify.....

k) How many pregnancies have you ever had in your life?

.....
.....

l) When was your last normal menstrual period?

.....
.....
...

SECTION B: KNOWLEDGE ON MALARIA IN PREGNANCY

a) Have you ever heard of malaria in pregnancy?

- 1. Yes []
- 2. No

b) If yes, what is the source of your information? (Tick all correct answers) []

- 1. Health worker
- 2. Media
- 3. Relatives
- 4. Friends
- 5. Others, (specify).....

c) What are the symptoms and or signs of malaria in pregnancy?

.....
.....
.....

d) In your own opinion what causes malaria?

.....
.....
.....

e) How can one protect herself from malaria in pregnancy?

.....
.....
.....
.....
.....
.....
.....
.....
.....

SECTIONC: UPTAKE/UTILISATION OF THE MALARIA INTERVENTIONS

a) Have you suffered from malaria during this pregnancy? []

- 1. Yes
- 2. No

b) If yes, how was the diagnosis made? (Check antenatal card or patient record if available)

.....
.....
.....

c) Did you receive any treatment? []

- 1. Yes
- 2. No

d) If yes, what treatment were you given?

.....
.....

e) Do you know how you could have protected yourself against malaria?

[]

- 1. Yes
- 2. No

f) If yes, how could you have done this?

[]

- 1. Having a mosquito net
- 2. Sleeping in a mosquito net
- 3. Taking tablets of fansidar
- 4. Having your house sprayed
- 5. Other specify

g) Do you know where you can obtain these services to protect yourself against malaria can be obtained?

- 1. Yes []
- 2. No

h) If yes, which of the following? []

- 1. PHC post
- 2. Health facility
- 3. Hospital
- 4. Others, (specify) _____

i) Do you have any insect treated mosquito nets? []

- 1. Yes
- 2. No

j) If yes, how many? []

- 1.0
- 2.1
- 3.2
- 4.3
- 5. Other specify

k) Did you sleep in an ITN last night?

- 1. Yes
- 2. No []

l) If No, give reasons why

.....
.....

m) During this pregnancy, have you ever taken any drugs in order to prevent yourself from getting malaria?

- 1. Yes
- 2. No

[]

n) What drugs did you take to prevent malaria?

.....
.....

o) If SP/fansidar how many doses?

- 1. Zero
- 2. One
- 3. Two
- 4. Others specify

p) Have you had your house sprayed to protect your family against mosquito bites?

- 1. Yes
- 2. No

q) If yes, when was it sprayed?

.....

r) If no, what are the reasons?

.....

s) What do patients that have malaria do so that they are cured in your community?

.....
.....

Rapid diagnostic test

- 1. Yes
- 2. No
- 3. Other specify

Results of rapid diagnostic test

- 1. positive
- 2. negative
- 3. Other specify

APPENDIX III.

FOCUS GROUP DISCUSSION GUIDE

Number of respondents/participants_____

Composition of respondents/participants_____

Language used during discussion_____

Date: _____

Duration_____

Place: _____

INSTRUCTIONS TO THE RESEARCHER

Welcome the respondents (participants)

Self introduction of researcher and the recorder to the group.

Request the participants to introduce themselves.

Obtain verbal consent from the group to conduct the discussion.

Explain the main purpose of the discussion

Assure the group of confidentiality and voluntary participation

KNOWLEDGE ON MALARIA IN PREGNANCY

- 1) What is malaria? How common is malaria in pregnancy in your community?
- 2) What are the causes of malaria?
- 3) How does someone contract malaria?
- 4) Which groups of people are most affected by malaria? What are the factors that lead to malaria in pregnancy?
- 5) How can somebody protect himself /herself from contracting malaria?
- 6) What activities are the Ministry of Health and other partners implementing to protect against Malaria in your area? Which areas are most affected by MIP in your community?
- 7) How are these activities received by the pregnant women in your area?
- 8) Do you know of any reasons why some pregnant women don't access these services?

UTILIZATION/UPTAKE OF MALARIA INTERVENTIONS

- 1) How is the availability to and utilization of IPT, ITN, IRS, and appropriate drugs by the pregnant women in your catchment area?
- 2) What are challenges of sleeping in an ITN every single night by the pregnant women in your catchment area?
- 3) What are the benefits and risks of having your houses sprayed to protect you against mosquito bites?
- 4) What advice would you give other pregnant women about ITNs, IRS, and IPT?
- 5) Why do some pregnant women fail to access and utilize IPT, ITN), IRS and appropriate anti malaria drugs in your catchment?

