

# PREVENTION OF MALAIRA IN PREGNANCY (PMIP) — INFORMATION COMPREHENSION, MOTIVATIOIN AND ADHEREANCE AMONGST ANTENATAL CLINIC ATTENDEES IN TARABA, NIGERIA. A DESCRIPTIVE SURVEY.

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## Abstract

### Background :

Malaria constitutes grave consequences on the health of the mother and her foetus especially, in sub-Saharan Africa where the burden is most severe.

### Methodology:

This study utilizes a descriptive survey design to optimize Malaria in Pregnancy Prevention (MIPP) Information Adherence to at least a 95% prevalence rate and improve appointment keeping to 100%. The information Motivation Behavioral skills model (IMB) was used to explain how MIPP information adherence can be achieved efficiently in malaria treatment. A validated questionnaire was used to gather information from 384 ANC attendees. This followed ethical permission from the Taraba state ministry of Health and informed consent from participants. Descriptive statistics and frequency distributions were employed in the analysis of data. Simple linear regression analysis was used to determine the relationship among variables.

### Results:

Respondents mean age was  $29.38 \pm 8.73$ . Majority were married (88%), self-employed (40.1%), Christians (73.7%) of Kuteb ethnic origin (25.3%), having secondary educational attainments (39.3%). Study on 10-point scale reported the level of MIPP of malaria in pregnancy related information,  $\bar{X} = 9.1 (0.86) \pm 1.20$  having significant relationship with adherence ( $p < 0.001$ ); comprehension on 40-point scale reported  $\bar{X} = 33.2 (0.43) \pm 8.43$  also having significant relationship with adherence ( $p < 0.001$ ): motivation on 18-points scale, scored,  $= 13.5 (14.4) \pm 2.8$  having significant relationship with outcome variable ( $p < 0.001$ ) and self-reported adherence on 32-points scale, scored  $\bar{X} = 21.6 (0.36) \pm 6.99$

### Conclusion:

Information is important but do not guarantee behavior change.

### Recommendation:

Information should be accompanied with motivational components, to be more effective than the usual clinic-based health talk.

**Keywords:** Demography, Information, Adherence, Motivation, Behavior, Submitted: 2023-06-11

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## 1. Background to the study:

Malaria constitutes a significant public health problem within the tropical and sub-tropical regions of the world (WHO, 2023), it has serious consequences on the health of the mother and her foetus, especially in sub-Saharan Africa where the burden is most severe (Hill, Dellicour, Bruce, Ouma, Smedley, Otieno, Ombock, Kauruki, Desai, Hamel, Kuile and Webster, 2013; Harrison, Olufunlayo and Agomo, 2012). Malaria is caused by five major species of Plasmodium, *falciparum*, *ovale*, *Malariae*, *Vivax*, and *Knowlesi*, but one of major public health importance is *Plasmodium falciparum* (Ansari, Templeton, Subudhi, Ramaprasad, Tang, Lu, et al., 2016). Pregnant women are particularly vulnerable to malaria infection and this can be attributable to their low level of immunity which makes them susceptible and the effect of malaria in pregnancy leads to increased morbidity and mortality among at-risk groups (Sherman, 2013). The virulence of *Plasmodium falciparum* malaria is of great significance in Africa where it poses a greater problem than in other parts of the world (WHO, 2023). Malaria is one of the most tenacious and deadly infectious diseases of man transmitted by the bite of an infected female anopheles' mosquito (Ansari, Templeton, Subudhi, Ramaprasad, Tang, Lu, et al., 2016). Symptoms of malaria appear from the tenth to the fourteenth day after being bitten by an infected female anopheles' mosquito and it is characterized by fever, muscle pain, headache, vomiting, and abnormal enlargement of the spleen and liver (Dilicour, 2010). Malaria in pregnancy constitutes a great concern globally, in Africa, sub-Saharan Africa, and Nigeria in particular (WHO, 2023). It is a major health concern in Nigeria that the infection leads to about 15 percent of maternal anemia cases, 5 to 14 percent of the low birth weight cases reported, and increased rate of high blood pressure in babies (Ayoola, 2011), hence, it inflicts substantial risks

for the mother, her fetus and the neonate (WHO, 2023).

The World Health Organization gazette recommended a guideline for the prevention of malaria in pregnancy and its treatment as a tripartite approach including intermittent preventive treatment (IPTp); insecticide-treated nets (ITNs) and prompt and effective case management (WHO, 2010). Intermittent preventive treatment of malaria in pregnancy is a full therapeutic course of anti-malaria medicine given to pregnant women at routine antenatal care visits regardless of whether the recipient is infected with malaria or not. Intermittent preventive treatment of malaria in pregnant women reduces maternal malaria episodes, maternal and fetal anemia, placental parasitamaia, low birth weight, and neonatal mortality (Larsen, 2012). The World Health Organization recommended three preventive and control strategies that can be implemented to curb the incidence of malaria in pregnancy and the complications associated with it. First is the regular use of Insecticide Treated Net (ITNs). Intermittent Preventive Treatment with 2 doses of Sulphadoxine pyrimethamine (IPTp-SP) and the effective case of management of malaria Attacks (WHO,2023). This preventive treatment of malaria in pregnancy with sulphadoxine pyrimethamine (IPTP) in all areas with moderate to high malaria transmission in Africa (Falade, 2016) is highly recommended in Africa, particularly in Nigeria. In October 2012 World Health Organization recommends that this preventive treatment be given to all pregnant women starting from the second and the third trimester but not in the first trimester (WHO, 2012).

Intermittent preventive treatment of malaria in pregnancy (IPTP) should be given at least, twice during pregnancy; the doses could be increased up to 3 or more doses especially in HIV-positive women (Eijk, 2013) In 2016 World Health Organization published new guidelines on antenatal care by recommending an increase in the number of contacts between care providers and pregnant women (WHO, 2016). This guideline makes pregnant woman to have more opportunities to listen to health talks, (informa-

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tion), comprehend the counseling messages, and adhere to the intermittent preventive treatment of malaria in pregnancy regimen (WHO, 2017). The antenatal clinic is the entry point for pregnant women where health information sharing about IPTP of malaria, Insecticide-treated nets, and other treatment regimens take place (WHO, 2010). Information sharing will facilitate an understanding of malaria and the benefits of intermittent preventive treatment of malaria in pregnancy including other recommended treatment regimens (Ameh, 2016). Based on currently available evidence, intermittent preventive treatment of malaria in pregnancy with sulphadoxine-pyrimethamine (IPTP-SP) remains effective in preventing the adverse consequences of malaria on maternal and fetal mutations linked to sulphadoxine-pyrimethamine which are prevalent in *Plasmodium falciparum* (WHO, 2016).

In 2008 the proportion of women who received Antenatal care clinic (ANC) from a skilled provider was estimated at 65 percent in the north-central region of Nigeria, 43 percent in the northeast, and 31 percent in the northwest, compared to 87 percent, 70 percent, 87 percent for the southeast, south-south and southwest region (WHO, 2016).

The Nigeria malaria indicator survey 2010 suggests that only 33.7 percent of pregnant women slept under an insecticide-treated net (ITN) (Salomeo, 2017). Of the estimated 1-3 million malaria deaths recorded worldwide each year, 90% of the cases occur in sub-Saharan Africa (Mabinda, 2010). Intermittent preventive treatment for malaria in pregnant women is one of the essential services under the focused antenatal care service package (Olukoya, 2017). Most studies come from sub-Saharan Africa, where approximately 25 million pregnant women are at risk of *Plasmodium falciparum* infection every year (Valea, 2012) and one in four women have evidence of placental infection at the time of delivery (Balugun, 2010). *P. Falciparum* infections during pregnancy in Africa rarely result in fever and therefore remain undetected and untreated (Ghani, 2012). Meta-analyses of intervention trials suggest that successful prevention

of these infections reduces the risk of severe maternal anemia by 38%, low birth weight by 43%, and prenatal mortality by 27% among primigravidae, (Garner, 2012) Low birth weight associated with malaria in pregnancy is estimated to result in 100 000 infant deaths in Africa each year. Although primigravidae are most affected by malaria, the consequences for infants born to multigravida women in Africa may be greater than previously appreciated (Lancet, 2009). This is because HIV increases the risk of malaria and its adverse effects, particularly in multigravida, and recent observational studies show that placental infection almost doubles the risk of malaria infection and morbidity in infants born to multigravida. Outside Africa, malaria infection rates in pregnant women are much lower but are more likely to cause severe disease, preterm births, and fetal loss. *Plasmodium vivax* is common in Asia and America and, unlike *Plasmodium falciparum*, which does not cytoadhere in the placenta, yet, is associated with maternal anemia and low birth weight (Berneth, 2012).

The effect of infection in the first trimester, and the longer-term effects of malaria beyond infancy, are largely unknown and may be substantial. Better estimates are also needed of the effects of malaria in pregnancy outside Africa and on maternal morbidity and mortality in Africa. Global risk maps will allow a better estimation of the potential impact of successful control of malaria in pregnancy. To ensure adherence to IPTp doses by the pregnant woman attending the antenatal clinic, clear information concerning the risks of malaria in pregnancy is a necessity, IPTp is of help to the woman and her fetus (Ayubu, 2012). To adhere to intermittent preventive treatment of malaria in pregnancy, adequate information is given concerning how to take the drug, its benefits, and possible side effects (Kuile, 2014). Health education given in antenatal clinics creates knowledge, awareness, comprehension of the health education counseling, and adherence to the regimen of Sulphadoxine pyrimethamine (the drug of choice) (Oguike 2016). The WHO recommends Sulphadoxine pyrimethamine to be given under directly observed treatment (DOT) (Radera 2014)

and it is the responsibility of the midwives to give information in a clear, short, and precise manner. The

midwives make the pregnant women know the benefit of attending ANC regularly and taking SP at least two doses (Exaverry, 2014). Intermittent Preventive Therapy for Malaria in pregnancy takes advantage of the Antenatal Clinic days where it is being offered alongside other activities such as monitoring of blood pressure, HIV, Hepatitis B (HBSAg) testing, Hepatitis C Virus (HCV), Urine and stool tests, etc.

Limited research work has attempted the use of Information Motivation Behavioral theories in exploring malaria prevention in Nigeria, its use could provide a significant explanation for how malaria prevention can be achieved efficiently. Therefore, the purpose of this study was to evaluate the Prevention of Malaria in Pregnancy (PMIP) – Information Comprehension, motivation, And adherence among Antenatal Clinic Attendees in Takum, Taraba, Nigeria.

## 2. Methodology:

### 2.1. Research Design:

Descriptive survey design was adopted for this study.

### 2.2. Research Setting:

This study was conducted in General Hospital Takum in Taraba State of Nigeria for six weeks in July and August 2020.

General Hospital Takum is a secondary health institution located in Rogo ward in Takum town of Taraba state. It was established as Mission Hospital in January 1958 and later taken over by the Taraba State Government in the 1970s. General Hospital Takum Carter for residents across Donga, Ussa, Yangtu, Kurmi, and Takum Local Government Areas as its catchment areas. Takum Local Government area was created out of Wukari Local Government in 1975. Takum borders the Republic of Cameroun in the south, Ussa, Local Government to the west, and Donga Local Government to the north. Districts within Takum

are Abuja ward, Kwambai, Jenuwa, Rogo, Dutse, Kashimbila, Bete, Chanchanji, and Bika.

General Hospital Takum is a public Health Facility that was established on 1/1/1966 and is located at Rogo in Takum Local Government Area. The Hospital lies along Barracks Road at coordinates Long Long 9.97042, Lat 9.97042 <sup>°</sup>E. The ethnic tribes in Takum include Chamba, Jukun, Kuteb, Ichen, Hausa, and Tiv, with an area of 2,503km<sup>2</sup> and a population of 135349 (2006 census). Takum has Multiple ethnic groups with more than a dozen distinct local languages mostly Jukun language and Bantoid language, Bete, Bukwen, and Chamba Leko. Home languages are the Jukun, Kuteb, Kapyra, Ikpan, Parti, Lufu, Marshi, Yukuben, Hausa, and Tiv. Takum local government area has many private hospitals and clinics so many people prefer to patronize their relative's clinics and hospitals rather than attending

General Hospital. The Hospital offers the following services, Medical Services, Surgical Services, Pediatrics Services, Ambulance Services, Special Clinical Services, Obstetrics & Gynecology Services, Dental Services, Laboratory, etc, and pulls patients from the nearby Donga, Ussa, and Kurmi Local Government Areas as well as the Benue state.

### 2.3. Sampling Area:

General Hospital Takum was considered for the study.

### 2.4. The population of the study:

The study population consisted of the entire pregnant women attending the Antenatal clinic in Takum.

### 2.5. Sample/ Sampling technique:

A multistage sampling technique led to a selection of southern Taraba out of the three geopolitical zones in the state. This was followed by a random selection of Takum General Hospital studied out of the four General Hospitals in the region. Systematic sampling of pregnant women found on the Antenatal clinic register was then considered for inclusion as pregnant women attending ANC

in the selected Hospital, however, those who declined participation are those not found in the clinic at the time of the study, or who were being transferred out to a far place were excluded from the study. The sample size was determined using a sample size computation: - Determination of sample size using the formula,

$$SEM = Z\alpha \times \sqrt{\frac{\sigma}{N}}$$

Where SEM= Standard Error of Mean

$\sigma$  = Variance = pq

P = 50% = 0.05

q = 50% = 0.05

$Z\alpha$  = Margin of Error (ME) = 1.96

Substituting these values,

$$SEM = Z\alpha \times \sqrt{\frac{\sigma}{N}}$$

$$1.96 = \frac{1.96 \times \sigma}{\sqrt{N}}$$

$$\sqrt{N} = \frac{1.96 \times \sigma}{0.1}$$

$$N = \frac{1.96^2 \times \sigma^2}{0.1^2}$$

$$= \frac{1.96^2 \times p \times q}{0.05^2}$$

= 384

The computed sample size was thus 384 but 400 samples were considered to cater to attrition rates

## 2.6. Variables:

Five variables measured in this study included respondents' socio-demographic characteristics relevant to this study, such as Age, sex, marital status, religion, education, ethnicity, and occupation. Other variables measured were IPTP information and motivation which are thought to influence Behavioral skills and or adherence to the treatment instructions being the outcome variables.

## 2.7. Null hypotheses testing:

Three Null Hypotheses were to verify the path that leads to higher adherence (action) whether information alone is sufficient to lead to adherence or whether there has to be the motivation of the information before willingness, and readiness will be inspired to adherence. These hypotheses included.

There will be a significant relationship between information and adherence to Intermittent Preventive Treatment of malaria in pregnancy amongst the pregnant women in this study.

There will be a significant relationship between comprehension of Intermittent Preventive Treatment of malaria in pregnancy and behavioral outcomes among pregnant women in the study.

There will be a significant relationship between motivation and adherence among pregnant women in this study.

## 2.8. Data collection method and instrument for the study:

Questionnaires (well-structured and validated) were designed for information to be received from the target population. The questionnaire was divided into five sections which include socio-demographic characteristics, IPTP-SP information received by ANC attendees, level of comprehension of IPTP-related information, motivation, and level of self-reported medication adherence to IPTP- SP information. Section B1 contained 10 questions about the nature of the information received on Intermittent Preventive Treatment of malaria in pregnancy by Antenatal care clinic attendees. The 10 questions required a "Yes" or "No" response pattern enquiring if messages related to the statements were delivered to the respondents during the information sessions (Health education) was measured on 10 point scale Section B2 has 10 questions on the level of comprehension of IPTP – SP related information with the following response pattern, well understood (WU), understood (U), slightly understood (SU) and not understood or information not given (NG) it was measured on 10 points scale Section C comprises of motivation to adherence to

IPTP medications, it has 6 questions with measured variables on Likert scale response pattern of strongly agree (SA) Agree (A) Disagree (D) and strongly disagree (DS) measured on 6 points scale. Section D is the level of self-reported medication adherence to IPTP – SP information with 8 questions, with the response patterns of 1 – 5, 1 = Always, 2 = Often 3 = Occasionally 4 = Rarely 5 = Never. Measured 32 points scale.

### **2.9. Procedure for data collection:**

A total of 4 research assistants were trained in data collection techniques using the interviewer-administered questionnaire. Training of the assistants covers every aspect of the study procedures, the objectives of the study, research ethics and conducting the client's rights, confidentiality, informed consent, and identification of potential respondents; the assistants were selected from amongst the health providers to shield the clients from outsiders who may breach the client's trust and confidentiality. Every tribe in the community was represented. They assisted in approaching prospective respondents and in providing information about the research in various local languages.

### **2.10. Measures:**

A well-structured questionnaire was designed by the researcher for easy collection of data, it addressed socio-demographic data such as Age, Sex, Marital status, Religion, Education, Ethnicity, and Occupation. Also, information motivation behavioral model constructs. Multiple-item summative scales were constructed from the questions to measure the items in the questionnaire and the variables in the study. Constructs of the information motivation behavioral model included information pregnant women Received at the Antenatal care clinic concerning the use of Intermittent Preventive Treatment of malaria in pregnancy. This section required whether certain information was delivered to the clients with the response pattern of 'Yes' or 'No' (and score 1 point for correct answer and 0 points for wrong answers), totaling 10 points score for information,

The extent to which this information was comprehended or understood, enquired if the clients understood how malaria infection is transmitted, information on serious hazards malaria posed to both the mother and the baby (Fetus). The use of anti-malaria drugs, when to take it, how many doses and when to start, the benefits of Intermittent Preventive Treatment of malaria in pregnancy to the pregnant woman and her unborn baby, The importance of keeping appointments with Health care providers,- consequence of not taking the recommended anti-malaria drugs and also how to prevent malaria infection. This section had the response pattern, well understood (score of 4 points) to not understood, and then the information was not given (0 points) for each item and with a total score of 10 points for information comprehension. The motivation was measured using questions that enquired whether enough privacy was provided at the time of counseling or treatment, whether respect was given to the pregnant women in the clinic, incentivizing the pregnant women who received from the clinic, free sulphadoxine-pyrimethamine issued to the clients. Some special gifts in the form of Omo, insecticide-treated mosquito nets. The family provides Social supports from religious groups and other support groups who assisted the pregnant woman. This section had a Likert-type response pattern of strongly agreed to strongly disagree scoring 0 points for wrong answers and 3 points for right answers with a total score of 18 points for motivation. Adherence was measured by how often the client takes the prescribed malaria medication, reduction in the quantity of the medication without telling the nurse or the doctor, skipping to attend antenatal clinic appointments as a result of forgetfulness, if the health provider is notified if the client traveled out of town on clinic days, Stoppage of malaria drugs because the client feels a little bit stronger and without symptoms, Whether a client finds it not easy or convenient to swallow malaria drugs, those who forget their malaria drugs because no symptom is felt, The busy in remembering to take malaria drugs, and not being able to adhere to treatment. Making the response pattern of these variables ranged from " always "

to "never" (wrong responses scored 0 points and right responses scored 4 points) with a total of 32 points for this variable measured adherence.

### **2.11. Data management and statistical analysis:**

Retrieved questionnaires were sorted and checked for completeness and analyzed with the use of computer software, statistical packages for social sciences (SPSS) version 21 which allowed for the estimation of measure of central tendency and dispersion.

Descriptive and analytic/inferential statistics were used to express the data, Pre and post-test scores were applied, a test of Hypothesis was presented, level of significance is  $<0.05$  was considered statistically significant.

### **2.12. Validity and reliability:**

This study instrument was validated by checking the structure of the construct, contents, and items generated by my supervisor Dr. Chiegil Joseph Solomon, who thoroughly checked and made necessary amendments and corrections to ensure validity. Content validity and construction were enhanced through literature review content related to the problem being studied. To ensure the accuracy of the data collected, a measuring scale was developed, and constructed from a suitable model the information, motivation, and behavioral skill model (fisher and Fisher 1992) was used to reveal the variables for designing the instrument. Pretests or tests and retests of the developed instrument were done to ensure consistency and reliability in the measurements.

After the pilot study, the structured questionnaire was modified technical terms were eliminated, and items were written in simple clear English, a major challenge was however related to the accuracy of translating the meaning of the questions into the local dialect or language by the research assistant at the time of training. The questionnaire was subjected to a reliability test and scales were sufficiently found to be reliable (**Cronbach Alpha= 0.814**), although it was noted that some scales could be improved.

### **2.13. Ethical issues:**

This study was conducted in compliance with the ethical research guidelines and legal requirements for the study. The federal Ministry of Health's National Health Research Ethics Committee through the Health Services Management Board Taraba State, has permitted research work in the state. Data collection is done in accordance with the Nigerian Ethical Training component of the collaborative Institutional Training Initiative on Human Subjects Research.

## **3. Results:**

### **3.1. Demographic Characteristics of Respondents (N=384):**

This study enrolled 400 participants who were considered eligible for the study with a return rate of 384 out of which six declined the study and ten questionnaires were not properly completed. Respondents' ages ranged between 16 years to 60 years with a mean score of 29.38 and a standard deviation of 8.73 (See Table 1). The self-employed represented a majority (40.1%) of respondents, most of whom were married (88%) and of the Christian faith (73.7%). The educational status of the majority of the respondents was of secondary education level (39.3%). Most of them had over two children (42.4) and were of kuteb ethnic origin (25.3%) and other tribes (38.3%).

#### **3.1.1. Table 1: Frequency distribution of demographic characteristics of respondents in this study:**

### **3.2. Prevention of Malaria in pregnancy related Information.**

In this study, IPTP-SP-related information was considered as 12 items on a 12-point scale enquiring whether certain information basic to IPTP-SP was delivered to participants during their clinic attendance.

Results, as indicated in Table 4.3 showed that over 90% of respondents reported having received information about malaria and its prevention (97.4%), transmission (94.8%), signs and symptoms (97%), and treatment. Other information received included the effects of treatment on the

Table 1: Frequency distribution of demographic characteristics of respondents in this study.

Variables	*** (N = 384)	
	N	(%)
Occupation		
• Unemployed	110	28.6
• Self-employed	154	40.1
• Civil Servant	120	31.3
Marital Status		
• Single	30	7.8
• Married	338	88.0
• Separated	7	1.8
• Widow	9	2.3
Religion		
• Christian	283	73.7
• Islam	98	25.5
• Traditional Belief	3	0.8
Education		
• Non-formal	38	9.9
• Primary	59	15.4
• Secondary	151	39.3
• Tertiary	136	35.4
No. of Children		
• First Child	93	24.2
• Second Child	128	33.3
• More than two	163	42.4
Ethnicity		
• Jukun	80	20.8
• Kuteb	97	25.3
• Chamba	60	15.6
• Others	147	38.3

\*\*\* Respondents in this study

mother and the fetus, when to take the medication, benefits of the treatment and appointment keeping with a health care provider, signs and symptoms of malaria including the danger of self-medication. However, only 52.2% reported that audio-visual aids such as models and pictures were used to illustrate the information presented (Table 4.3). IPTP-SP-related information on the maximum score of the 10-point scale reported a mean score of 9.1 (0.86)±1.20 at 91% of the maximum score (a very high level of information), having a significant relationship with adherence (P< 0.001).

### 3.3. Self-Reported Level of Comprehension of IPTP-Related Information.

In this study, respondents' comprehension of IPTP-related information was considered on a 40-points scale. Respondents reported whether IPTP-related information received was understood following the response pattern "well understood" to "not understood", and whether such "information was not given."

Over 84.1% of respondents reported understanding information delivered to them about malaria and its prevention, its transmission (84.1%), effects on mother (84.6%) and fetus



(81.5%), and treatment/ medications benefits (86%), and return follow-up (Table 4.4). IPTP-SP-related information comprehension on a maximum score of 40-point scale reported a mean score of 33.2 (0.43)±8.4 at 83% of the maximum score (a high level of comprehension).

### **3.4. Level of Adherence to IPTP-Information.**

This section consisted of 8 items Self-Reported adherence measured on a 32-point scale. It enquired how often respondents did certain activities that contributed to their adherence or non-adherence to recommended treatments of malaria during pregnancy. In this study, (61%) of the respondents reported not forgetting to take their recommended IPTP medications. About 70.9% do not forget attending ANC, 74% seek counsel from health care providers about their medication when travelling, and 61.5% reported taking their IPTP Medication even when they think they feel fine, better, or worse when they took it. The frequency distribution for self-reported adherence is found in Table 4.6.

Self-Reported Adherence with a maximum score of 32 points reported a mean score of 21.5 (0.35) ±.98 at 67.1% of the maximum score. This revealed that Adherence to IPTP-SP-related information and Medication instructions was at intermediate levels (above average). However, from this study, respondents achieved an adherence prevalence rate of 67.5% away from the minimum adherence rate of 95% (with a mean score of 21.6 on a 32 points scale). A summary of Descriptive statistics for the analysis of variables is shown in Table 2.

## **4. Discussion of Results**

The age of the respondents ranged from 16-60 years, and of childbearing age, who are mostly women, experienced in pregnancy and listened to health counseling messages about Malaria in pregnancy Prevention. They are prone to malaria during pregnancy because they have a great attraction to mosquitoes (Kabbale, 2013), similar findings were found in a study by Rogerson (1999).

They have reached the age of accountability and could give reasonable responses to the federal ministry of Health (2015) pregnant women are the only group of people accessing Intermittent Preventive Treatment Of malaria in pregnancy and receiving Malaria in pregnancy preventive treatment in the Antenatal care clinic, they are responsible for themselves. About 338 (88.0%) of them were married, going to the result, it is observed that the husbands and family members served as strong support for adherence to the medication of intermittent preventive treatment of malaria in pregnancy. The Information Motivation Behavioral Skills Model (IMB) sees the need for social motivation which agrees with the report of the National Statistics Office and ICF Macro2011 (NSO). Females naturally assume the role of caring especially in the health care of the family.

Kuteb as an ethnic group had the highest number of responses of 97{25.3}, most of the respondents are of the Christian faith (73.7%), A great number were self-employed, the highest number of them passed through tertiary education, the study showed a positive attitude toward sulphadoxine-pyrimethamine especially among the educated ones. This is in agreement with a study conducted in Malawi in 2010 and also in Nigeria in 2009 by Abaisiattai. The ability of the educated pregnant women to read and write placed them in an advantageous position as compared to the uneducated ones as observed by Nsibu (2016). Information about intermittent preventive treatment of malaria in pregnant was received from Antenatal Clinic in this study about malaria infection, transmission which is 94.8%, the signs, and symptoms, and the prevention was also taught to the women at the ANC which 97% attested to that. There was other information received by the women which includes the effect of treatment on the mother, adverse side effects of the drugs on the fetus, the time in which medication can be taken, the benefit of the treatment, and keeping appointments with a health care provider, the danger of self-medication was also stressed. The use of long-lasting insecticide mosquito nets was part of the information given to the IPTP clinic attendees. In this study, the

**Table 2: Summary of Descriptive Statistics for Respondents in this study**

Variable	Scale of measure	Mean $\bar{X}$	SE	$\pm$ SD
Information	10	9.1	0.86	1.20
Comprehension	40	33.2	0.43	8.43
Motivation	18	13.5	14.4	2.8
Self-Reported Adherence	32	21.6	0.36	6.99

Error of Mean; SE: Standard SD: Standard deviation

**Table 3: Simple Linear regression analysis on Factors (Independent Variables) associated with Information, Comprehension and Motivation Score related to Adherence to IPTP among pregnant women (n = 384).**

Independent Variable	b (95% CI $\beta$ )	t-statistics	P.V	R <sup>2</sup>
Information	1.291(0.896 – 1.686; 0.312)	6.421	0.001	0.095
Comprehension	0.694(0.454 – 0.933; 0.279)	5.690	0.001	0.078
Motivation	1.213(0.133 – 0.294; 0.257)	5.202	0.001	0.066

result showed a high level of information received by the participants which is supported by the findings of Atulomah (2015) which shows that the right kind of information should be given correctly and precisely to pregnant women to increase their awareness and knowledge in intermittent preventive treatment of malaria in pregnancy. According to Fisher and Harman, 2003 information is a necessary ingredient for modeling or building behavioral skills. If the level of information received at the Antenatal care clinic was adequate, the pregnant woman will adhere to the treatment of malaria during pregnancy. This is similar to a study conducted in Thailand and Ethiopia in 20013 by Abateon concerning the information. Where information is not adequately given the people will remain in their ignorance and it will be difficult to adhere to treatment.

Information received about the prevention of malaria in pregnancy was clear and well-understood. This is similar to a study conducted by the Centers for Disease Control (2019) where pregnant women comprehended the information received on intermittent preventive treatment of malaria. Clients understood how malaria is transmitted to others, and the effect of malaria on the pregnant woman and her fetus was well understood. This is also observed by Roll back Malaria (2012) concerning the comprehension of

intermittent preventive treatment of malaria in pregnancy amongst Antenatal clinic attendees (Amoran2013)

Motivation received by the ANC Clinic attendees was high levels in this study which is similar to a Nigeria study by Ahmed Dahiru (2019) where healthcare providers reported that the counselors know their job very well. Participants also reported receiving gifts and incentives from healthcare providers. Sulphadoxine pyrimethamane and insecticide-treated mosquito nets were also given to the pregnant women free of cost which served as a strong motivator to the pregnant women with a great effect on beliefs and behaviors towards malaria infection. Free provision of mosquito nets enables behavior change so that women and their children sleep inside the insecticide-treated mosquito nets, thereby improving security and protection against mosquito bites and malaria infection. Motivation will also increase clients' knowledge, understanding, and ability to adhere to the information received and facilitate behavior change. This finding is similar to the study carried out by Obol (2013) who found a positive relationship between information and motivation through the presentation of Gifts to those who complied with their treatment regimen provision of support by the family, husband, religious, and organization.

Adherence to malaria preventive messages and treatment was above average levels as respondents reported that, they never missed or forgot their treatments, or forgot to attend the Antenatal clinic with an adherence prevalence rate of 67.5%. participants reported taking intermittent preventive treatment of malaria in pregnancy, with about 2-3 doses of sulphadoxine-pyrimethamine before delivery. This finding is similar to a recent study conducted in Ghana in 2017 in which 87 and 99% of pregnant women took more than 3 doses of sulphadoxine-pyrimethamine before delivery (Anto, 2017). The study also reported that pregnant women do not forget their appointments with healthcare providers, sought counseling about their medication when they were to travel out of town, and took medications even when they feel better. This finding is similar to a study conducted by Kayento (2013), where factors reported to affect adherence as observed by World Health Organization (2012) included the Age of the pregnant woman, Educational background, level of information comprehension, type of motivation received and the authenticity of the adherence. Adherence is the bedrock of medical treatment so if pregnant women fail to adhere to their treatments, healing, and prevention of sicknesses fail thereby, complicating the disease. This goes in line with the study of Green (1999) who noted that Adherence proves the potency of drugs and treatment, and prevents drug resistance and treatment failure. (Iriat, 2015). Non-adherence shows that clients were not properly educated or counseled or there is no positive reinforcement which affects positive health behavior (Dawood, 2015).

## **5. Lessons Learnt/ Contribution of study to knowledge/ policies**

In this study, new insight has been given into the area of Malaria Prevention in pregnancy information comprehension amongst pregnant women attending Antenatal care clinics. Evidence shows that; motivation is a major predictor of adherence to treatment or preventive practices for malaria in pregnancy. This may be regarded as a prominent

factor in IPTP and malaria prevention in pregnancy. Motivational components should be embedded in all malaria prevention programs to address the issue of non-adherence behavior. Also, the consequences of non-adherence and the benefit of absolute adherence to malaria in pregnancy prevention and intermittent preventive treatment of malaria in pregnancy should be embedded in a framework that addresses many factors which contribute to or militate against adherence behavior, such as motivation, attitude, Ignorance, Husband's positive role, educational background of the pregnant woman, Age of the mother, clinic settings, etc.

## **6. Recommendation**

Recommendations drawn from the results of this study include:

- Government should put more effort into the treatment and control of malaria
- Nurses and Midwives in the Antenatal care clinic, health workers, and Non-Governmental Organizations should embark on sharing correct clear, and comprehensive information on Malaria prevention.
- Community efforts on environmental sanitation putting oil or kerosene on stagnant water should be encouraged to eradicate mosquitoes
- Stakeholders in the community should collaborate with non-governmental organizations, community-based organizations, and faith-based organizations to provide mosquito nets sp-sulpha doxine pyrimethamine in rural areas where poverty is a challenge.
- More research is needed in the treatment and prevention of malaria in pregnant women and children below the age of five years.

## **7. Conclusion**

This study addressed malaria prevention in pregnant women which is a stepping stone to the treatment of malaria in pregnancy.

Therefore, it is recommended that motivational components be incorporated into every intervention to prevent malaria in pregnancy.

## 8. Limitations of the study

A major challenge was the lack of financial support and a possible disguise in the translational meaning of the questions by the research assistants. The researcher addressed this during the training of research assistants.

### Bias

A random sampling of participants was done to have a representative sample, questionnaire items were carefully selected, reviewed by peer review, and revised to address opinion responses

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## 10. List of abbreviations:

WHO: World Health Organization  
ITNs: Insecticide Treated Nets  
IPTp-SP: Intermittent Preventive Treatment of Malaria with Sulphadoxine pyrimethamine  
ITNs: Insecticide Treated Net  
HIV: Human Immune Deficiency Virus  
ANC: Antenatal care clinic  
DOT: directly observed treatment  
HBSAg: Hepatitis B  
HCV: Hepatitis C Virus  
PMIP: Prevention of Malaria in Pregnancy  
ANC: Antenatal care clinic  
MIPP: Malaria in Pregnancy Prevention

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