Student's Journal of Health Research Africa
Vol. 4 No. 6 (2023): June 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i6.474
Original article

MALARIA IN PREGNANCY PREVENTION (MIPP) INFORMATION COMPREHENSION, MOTIVATION AND ADHERENCE AMONG ANTENATAL CLINIC ATTENDEES IN TARABA STATE SPECIALIST HOSPITAL,JALINGO, NIGERIA- A DESCRIPTIVE SURVEY.

Dr Solomon Joseph Chiegil[a,*] , Rachael Abeh Sani, Iranum Nimiruna[b], Uriah Danladi[c], Mercy Umeh Orji[a], Akilu Hamza[d], Grace Christopher Tanko Danjuma[c]

[a] *Global Healthplus Public Initiative, Nigeria.*
[b] *School of Midwifery, College of Nursing Science, Jalingo.*
[c] *College of Nursing Science, Jalingo, Taraba State.*
[d] *Department Applied Sciences, Taraba State College of Nursing, Jalingo.*

Abstract

Background:

Malaria continues to remain a global challenge. The study assesses Malaria in Pregnancy Prevention Information Comprehension and Adherence.

Methodology:

Descriptive survey using IMB model. A validated questionnaire was used to gather information from 404 ANC attendees. Descriptive statistics and frequency distributions were employed in the analysis of data and simple linear regression analysis was used to determine the relationship between variables

Results:

Result showed respondents mean age of 28.74 ± 68.07, married (70%), self-employed (48.8%), Muslims (52%) of Fulani ethnic origin (25.3%), and secondary educational attainments (39.9%). Information on 22-points scale reported a mean of 17.8 (0.1) ± 1.9 having significant relationship with behavioral skills (r = 0.199 and R^2 = 0.040), p <0.0001 and adherence (r= 0.114 and R2= 0.013), p-value <0.022; Comprehension on 74-points scale reported a mean score of 47.6 (0.6) ± 12.5. Motivation on 40-points scale reported 28.4 (0.2) ±3.7 having significant relationship with behavioral skills (r= 0.255, R^2= 0.065), P-value= <0.0001 and Adherence (r= 0.159, R2=0.025), P-value= <0.001). Behavioral skills on 36-points scale scored 30 (0.2) ± 3.2, having significant relationship with Adherence (r= 0.101, R2=0.010), P value= <0.042). Adherence on 45-points scale reported 27.1 (0.3) ± 5.0. However, respondents achieved adherence prevalence rate of 60.2% away from the minimum adherence rate of 95%.

Conclusion:

Though information facilitates behavior change, this is not guaranteed.

Recommendation:

Motivational components should be inculcated in all behavior change interventions than the usual clinic-based counseling.

Keywords: Demography, Malaria, Prevention, Adherence, Motivation, Pregnancy, Submitted: 2023-06-11 Accepted: 2023-06-17

1. Background to the study:

Malaria significantly continues to remain a global challenge (Björkman, Shakely, Ali, Morris, Mkali, Abbas, Al-Mafazy, Haji, Mcha, Omar, Cook, Elfving, Petzold, Sachs, Aydin-Schmidt, Drakeley, Msellem, & Mårtensson 2019) to public health and have affected all human race (Kwiatkowski, 2005 & WHO, 2020), especially, within the tropical and sub-tropical climatic regions of the world. It is transmitted by bites of infected female anopheles' mosquitoes (Iriemenam, Dosunmu, Oyibo, and Fagbenro (2011); Lee & Park (2013), and in pregnancy, it has adverse consequences on birth outcomes affecting the mother, her unborn fetus, and the neonate (Hill, Hoyt, van Eijk, D'Mello-Guyett, ter Kuile, Steketee, Smith, Webster (2013); Harrison, Olufunlayo and Agomo, 2012). Though efforts have brought about a substantial reduction in the transmission of malaria consequent to the successful implementation of malaria control efforts

(WHO, 2014), a great challenge to scientists remains for the complete eradication of the disease and its agents (Hiwat, Martínez-López, Cairo, Hardjopawiro, Boerleider, Duarte, & Yadon 2018).

This is threatening health and development, and bringing with it socioeconomic, demographic, and public health consequences (WHO, 2020). Five major strains of Plasmodium cause the disease (WHO, 2020), and include Plasmodium falciparum, Plasmodium. malaria, Plasmodium ovale, Plasmodium vivax, and Plasmodium Knowlesi (CDC, 2020) with P. falciparum and P. vivax being of greatest public health concern (WHO, 2020).

The World Health Organization (WHO) (2020) reported that in 2018, 228 million global cases of malaria were estimated, 93% being in Africa and 405000 deaths, 67% being in Africa and emphasized that Pregnant women and their unborn babies are the most vulnerable of all human groups (WHO, 2020). This is due, partly to their reduced immunity to the disease and their vulnerable social and economic status (WHO, 2017 & Centers for Disease Control and Prevention (CDC), 2016). Resultantly, they are more likely to suffer from severe malaria and to die from the disease as symptoms appear from the tenth to the fourteenth day of the bite by an infected female anopheles' mosquito. The disease is characterized by fever, muscle pain, headache, vomiting, and abnormal enlargement of the spleen and liver (Tahita, Tinto, Menten, 2013). Twenty-five million (25,000,000) pregnant women are said to be at risk of developing the disease (Plasmodium falciparum infection) yearly in sub-Saharan Africa, including their fetus and neonate (Sutan & Berkat (2014).). In the Ibadan study of the knowledge of malaria prevention among pregnant women and mothers of infants, Oladimeji, Tsoka-Gwegweni, Ojewole, & Tassi Yuna (2019) reported 1373 infected women (59.6% pregnant and 40.4% mothers of under 5 children). In this population, evidence of placental infection develops in one in every four women at the time of delivery (WHO, 2020). The infection also leads to about 15 percent of maternal anemia cases, 5 to 14 percent of low birth weights, premature delivery, and an increased rate of maternal high blood pressure (Ayoola, 2011).

Nigeria seems to be the country with the highest malaria cases (25% of global malaria cases) in 2018, having the highest number of deaths (24% of global malaria deaths) (WHO, 2019), and of these, about 76% of the population live in rural areas where the burden is three times greater (WHO 2019), with a high rate of the infection and transmissibility making them vulnerable to the diseases (Global Fund to fight against AIDS, 2019). This situation has continued to exist with much concern for global health with attendant attempts to halt the situation to meet the health needs of the vulnerable (Rudasingwa, & Cho, 2020). Consequently, many treatment approaches aimed at preventing Malaria have been proven effective (Pillay, Khodaiji, Bezuidenhout, Litshie, & Coetzer (2019); Burrows, Duparc, Gutteridge, Hooft van Huijsduijnen, Kaszubska, Macintyre, Mazzuri, Möhrle, & Wells, (2017) as rec-

* Corresponding author.
Email address: globalhealth.initiative@yahoo (Dr Solomon Joseph Chiegil)

ommended by WHO (2020), inculcated into the expanded roles of the midwife (Bbosa & Ehlers, 2017) and include educating pregnant women and implementing the use of long-lasting insecticidal nets (LLINs); in all areas with moderate to high malaria transmission in Africa, intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), as part of antenatal care services; Intermittent preventive treatment of malaria in infancy (IPTi), prompt diagnosis & effective treatment of malaria infections and effective indoor residual spraying (Nwe, Oo, Wai, Zhou, van Griensven, Chinnakali, Shah, & Thi, 2017 & CDC, ND). The Midwife adopts all strategies to prevent complications of malaria to the mother and the fetus including those associated with anemia and low birth weight (Brieger, 2022).

These measures have currently advanced therapeutic and prophylactic modalities (Nwe, et at., 2017) for the betterment of the quality of lives of the people (Sande, Zimba, Mberikunashe, Tangwena, & Chimusoro, (2017). However, treatment failure is most feared (Newton, Ward, Angus, Chierakul, Dondorp, Ruangveerayuth, Silamut, Teerapong, Suputtamongkol, Looareesuwan, & White, 2006) and is usually associated with non-adherence to treatment, development of resistant plasmodium variants (Wurtz, Pascual, Marin-Jauffre, Bouchiba, Benoit, Desbordes, Martelloni, Pommier de Santi, Richa, Taudon, Pradines. & Briolant, 2012), high cost and drugs toxicity (NIDA, 2020).

A major constraint to the elimination of malaria remains behavioural (UNDP/World Bank/WHP, ND) and Institute of Medicine (US) Committee for the Study on Malaria Prevention and Control; Oaks, Mitchell, Pearson & Carpenter, 1991), a major issue for consideration, therefore, there remains significant work to effectively eliminate these mosquitoes in all populations and to positively modify human behaviour (Dhiman & Sunil 2009). Hence Arroz JAH (2017) advocated a combination of early diagnosis and treatment, prophylactic medication, and effective counselling to modify preventive behaviour in people. It has however been observed that despite the educational and counselling component being introduced as part of Antenatal Care for pregnant women, non-adherence remains a big challenge (Stoney, Chen, Jentes, Wilson, Han, Benoit, MacLeod, Hamer, & Barnett, 2016) leading to the development of drug-resistant Plasmodium variants, high cost of treatment, long term toxicity and treatment failures (Challenger, Bruxvoort, Ghani & Okell (2017).

An essential component of patient/ client management strategy is information, presented as health teaching and/ or counselling (Parmar, Varun; Patel, Sangita; Iyer, Charoo, 2018) involving a discussion of clients social and psychological conditions (Fylkesnes, Sandøy, Jürgensen, Chipimo, Mwangala, Michelo, 2013) to gain patients cooperation, compliance, behaviour change, and treatment adherence. Continuity of care will be facilitated with consequent adherence improvement. Though current advances in treatment for malaria are now friendlier, the determination for consistent adherence continues to remain a factor in not realizing the desired quality of care (Pathickal, Patel, & Swaby, 2016).

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 assess Malaria in Pregnancy Prevention Information Comprehension, Motivation, and Adherence among Antenatal Clinic Attendees at Taraba State Specialist Hospital.

The speciftc objectives that guided the study includes, to:

1. Determine the level of Malaria in Pregnancy Prevention (MIPP)-information received during ANC in State Specialist Hospital, Jalingo
2. Determine the extent of perceived comprehension of the information received by the ANC clinic Attendees in State Specialist Hospital, Jalingo
3. Ascertain the level of motivation received by the ANC clinic Attendees in State Specialist Hospital, Jalingo
4. Ascertain the level of self-efficacy of ANC

clinic attendees to adhere to malaria in pregnancy prevention and treatment in State Specialist Hospital, Jalingo

5. Ascertain the level of adherence to Malaria in Pregnancy prevention regimen among ANC clinic Attendees in State Specialist Hospital, Jalingo

2. Methodology:

2.1. Research Design:

A cross-sectional study design was used to evaluate the IPTP Information Adherence among ANC Clinic Attendees in State Specialist Hospital, Jalingo, Taraba State.

2.2. Research Setting:

This study was carried out in Statae Specialist Hospital, Jalingo for six months from May and June 2021. Taraba State derived its name from River Taraba and was carved from the defunct Gongola state, (created on 27/8/1991) by General Ibrahim Badamosi Babangida with its capital city in Jalingo. It lies largely within the middle of the map of Nigeria with an undulating landscape containing a few mountainous features. Prominent among the mountains is the scenic and prominent Mambilla Plateau. Taraba largely lies within low forest vegetation in the tropical zone in the southern part and grassland in the northern part. The Mambilla Plateau lies at an altitude of 1,800 meters (6000 ft) above sea level with a temperate climate all year round. In the west, Taraba State is bounded by Nasarawa and Benue States, Plateau State lies northwest of the state, Bauchi and Gombe States in the north, Adamawa State in the northeast, and south by Nord-Ouest Province, claimed by-both Ambazonia and Cameroon republic.

Taraba State Specialist Hospital is located in Jalingo, the Taraba State capital city. The Hospital is one of the tertiary health care facilities in Jalingo and lies along Jolly Nyame Road on the outskirt of the town before Yagai, and the College of Nursing and Midwifery Jalingo. It serves a population of over 187,500 (NPC, 2016). It lies on geocoordinates (longitude 8O 54'27" N latitude 11 O23'35" E) and is bounded by Mayo Gwoi River at the northwest and Jauro Votto on the southern part. The Hospital was established in 2007 and is currently under the Leadership of a Chief Medical Director, being the sole state-owned specialist hospital and the sole state government Hospital in Jalingo at the moment. The hospital has over ten (10) departments out of which the major are the outpatient department, medical and surgical wards, laboratory departments, accident and emergency unit, theatre, paediatric and maternity, psychiatric, tuberculosis ward, etc. The hospital has over 1,000 staff out of which about 100 are medical officers and, over 400 nurses and others. The presence of hi-tech human and technological resources draws patients from across the neighboring local government Areas and States of Adamawa, Gombe, and Benue and also serves as a referral focal point from other General Hospitals across the State.

2.3. The population of the study:

The study population consisted of the entire pregnant women attending Antenatal clinics in Nigeria.

2.4. Sample/ Sampling technique:

A total of 405 participants were drawn from the study District in Taraba State. The researcher conducted this study over 6 months to cover the communities selected. Generally, multi-stage and systematic random sampling techniques were adopted in the study. In the first stage, purposive sampling led to a selection of the State Specialist Hospital, Jalingo, followed by a systematic selection of every second person in the ANC register. participants meeting inclusion criteria were considered and consent was sought for those selected for the study.

Criteria considered for inclusion were pregnant women attending antenatal clinic (ANC) in the selected Hospital and present at the time of the study, however, those who declined participation and 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.

Sample size was determined using a sample size computation formula: -

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

Figure 1: Where SEM= Standard Error of Mean

= Variance = pq
P = 50% = 0.05
q = 50% = 0.05
= Margin of Error (ME) = 1.96
Substituting these values,
= 384

The computed sample size was thus 384 but 5% was added to cater for loses and incompleteness thus 385 X 5/100 = 19.20 (20) + 385 = 405

2.5. 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 and appointment keeping being the outcome variables.

2.6. Data collection method and instrument for the study:

Well-structured and validated Questionnaires were designed for information to be received from the target population. The questionnaire was divided into five sections consisting of socio–demographic characteristics, IPTP information received by ANC attendees, level of comprehension of IPTP-related information, motivation, self-efficacy, and level of self-reported medication adherence to IPTP- information.

2.7. Procedure for data collection:

A total of 4 research assistants were trained in data collection techniques using the interviewer-administered questionnaire, covering 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.

2.8. 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 in section A. Also, information motivation behavioral model constructs with multiple-item summative scales was constructed from the questions to measure the items of the variables on the questionnaire. Constructs of the information motivation behavioral model included information on pregnant women received at the Antenatal care clinic concerning the use of Intermittent Preventive Treatment of malaria in pregnancy. Section B1 consisted of 10 questions inquiring about the nature of information delivered on Intermittent Preventive Treatment of malaria in pregnancy (IPTP), requiring a "Yes" or "No" response pattern. It enquired whether statements related to IPTP were delivered to the respondents during the information (Health Education) sessions and were measured on a 20-point scale. Section B2 consisted of 10 questions evaluating 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 50 points scale. Section C measured the level of motivation necessary to inspire adherence to IPTP medications and appointment keeping, it consisted of 8 questions measured on a 32-point scale with a Likert response pattern of strongly agree (SA) Agree (A) Disagree (D) and strongly disagree (SD). Section D measured the level of

Self-efficacy (behavioral skills) of the women to adhere to IPTP information with 8 items, measured on a 32-point scale and Section E finally evaluated the outcome variable, the level of self-reported adherence to IPTP information and appointment keeping with health care professionals with 8 items on a 32-point scale and with the response patterns of 1 – 5 (1 = Always, 2 = Often 3 = Occasionally 4 = Rarely 5 = Never).

2.9. Data management and statistical analysis:

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

Descriptive and analytic/inferential statistics were used to express the data, tests of Hypotheses were presented and a <0.05 level of significance was considered statistically significant.

2.10. Validity and reliability:

The instrument for this study was validated by considering the structure of constructs, contents, and items generated by my supervisors, Drs Horsfall and Dagogo Abam, who scrutinized and made necessary corrections to ensure face validity. Construct and content validity was enhanced through literature contents related to the problem under review. A measuring scale was also developed to ensure the accuracy of the data collected. Constructed from a suitable model, the Information Motivation Behavior (IMB) model (Fisher and Fisher, 1992) was used to unveil the variables for designing the instrument.

Reliability was ensured by pre-testing and by test, a retest of the developed instrument to ensure that consistency was being maintained in the measurement of what it was intended to measure. Having piloted the study, the questionnaires were modified, technical terms eliminated, and some items reformulated in clearer and everyday vocabularies. The researcher also eliminated duplicate questions.

The questionnaire scales were sufficiently reliable (Cronbach Alpha 0.795), although it was noted that some scales could be improved.

2.11. Ethical issues:

This study was conducted by ethical research guidelines and in compliance with the legal requirements for the study. Ethical clearance was obtained from the African Center of Excellence for Public Health and Toxicological Research, University of Port Harcourt Ethical Committee. Other permissions were obtained from relevant authorities and include implied informed consent/ permission from the Taraba State Specialist Hospital which granted the researcher express access to the Antenatal clinic and to the various participants studied. The research proposal was also presented before a team of internal and external experts, who gave rigorous scrutiny to it before approval was granted to proceed with the study.

3. Results:

3.1. Demographic Characteristics of Respondents (N=404):

This study enrolled 404 eligible participants, all of who responded adequately to the questionnaires except one whose questionnaire was found to be incomplete and considered invalid. Their ages ranged between 16 years to 44 years with a mean score of 28.74 and a standard deviation of 6.07 (See Table 4.1). The self-employed represented a majority (48.8%) of respondents, most of whom were married (70%) and of Islamic faith (52%). The educational status of the majority of the respondents was of secondary education level (39.9%). Most of them had two or more children (80.1%) and of Fulani (24.3%) and Mumuye (18.8%) ethnic origin (25.3%) with other tribes constituting (38.3%)

3.2. Malaria in Pregnancy Prevention (MIPP) related Information:

In this study, MIPP (Malaria in Pregnancy Prevention (MIPP) related Information was considered as 12 items on a 22-pointsd4f scale enquiring whether certain information basic to IPTP-SP

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

Variables	***(N = 404)	
	N	**(%)**
Occupation		
• Unemployed	130	32.2
• Self-employed	197	48.8
• Civil Servant	77	19.1
Marital Status		
• Single	49	12.9
• Married	283	70.0
• Separated	61	15.1
• widowed	11	2.7
Religion		
• Christian	178	44.1
• Islam	210	52.0
• Traditional Belief	16	4.0
Education		
• Non-formal	29	7.2
• Primary	135	33.4
• Secondary	161	39.9
• Tertiary	79	19.6
No. of Children		
• First Child	75	18.6
• Second Child	231	57.2
• More than two	98	24.3
Ethnicity		
• Mumuye	76	18.8
• Kona	68	16.8
• Hausa	70	17.3
• Fulani	98	24.3
• Others	147	38.3

*** Respondents in this study

was delivered to participants during their clinic attendance.

Results, as indicated in Table 4.3 showed that over 75% of respondents reported receiving information about malaria, its signs & symptoms, and its prevention. They were told about malaria transmission (82.8%), its effects on the mother and the fetus (62.1) when to take the medication (40.1), the benefits of the treatment (64.6), and appointment keeping with health care provider (59.2%) and danger of self-medication (44.3%). However, only 52.1% 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 22-point scale reported a mean score of 17.8 (0.1)±1.9 at 80.9% of the maximum score (a very high level of information). However, comparison for information across educational levels reported higher scores for tertiary education holders compared to non-formal, primary, and secondary levels.

3.3. Comprehension of Malaria in Pregnancy Prevention (MIPP) Related Information:

In this study, respondents' comprehension of IPTP-related information was considered on a 74-point scale and reported a mean score of 47.6 (0.6) ±12.5 at 64.3% of the maximum score on the scale (high level of comprehension). A comparison of the level of comprehension across educational attainments reported the highest mean scores of 51.6(1.40)12 for tertiary educational holders. Comprehension considered two sub-variables in its measure, self-reported comprehension and Knowledge. Self-reported comprehension was considered on a 50-point scale and reported a mean score of 35.1(0.4)± 8.1 at 70.2% of the maximum score (high level of comprehension). In this section, 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." About 74.3% of respondents reported understanding information delivered to them about malaria and its prevention, its transmission (74.3%), effects on mother and fetus (72%), and return follow-up or scheduled ANC visits (78.9%) (see Table 4.4).

Self-Reported level of Comprehension was confirmed by testing respondents' level of knowledge and evaluating the basic knowledge of the nurse about the IPTP regimen for pregnant women. Results, as indicated in Table 4.4 showed that 60.6% of the participants know about the Signs and Symptoms of malaria, 59.9% know that Malaria is a Parasitic disease, they also know about its transmission (51.2%), prevention (61.4%), groups at risk (54.7%), treatment (34.4%) and appointment keeping with health care provider (52.2%). knowledge was measured on a 24-point scale and found to score a mean of 12.5 (0.3) ± 8.1 at 52.1% of the maximum score (an above-average score). This information is found in Table 4.7.

This section measured motivation in terms of self-reported, as incentives and reinforcements. For this section, 83.1% of the respondents reported having enough privacy and respect (26%). Free insecticide-treated bed nets were given to 60.9% without cost including IPTP drugs (43.2%), Various incentives were given for adherence (49.8%), and 62.6% receive social support from family, religious groups, and/ or other social groups.

Motivation for this sample (N=404) was measured on a scale of 40 points and reported a mean score of 28.4 (0.2) ±3.7, representing 71% of the maximum score. This showed that respondents' motivation was high (Table 4.5). When compared across educational levels, respondents scored 29.4(0.48)4.2 (highest) for higher educational holders, and 29.4(0.56)3.0 for non-formal education which is seen to be by chance.

3.4. Behavioral Skills (Self-Efficacy) for Adherence to Treatment Instructions:

In this study, Self-Efficacy to adhere to information about IPTP of Malaria in pregnancy was considered as 9 items on a 36-point scale. While the majority of the respondents, (72.5%) were determined to keep to all treatment guidelines throughout pregnancy, 71.8% reported they cannot miss clinic appointments with Health care providers, keep to counselling information (37.6%), Determined to obey all counsels (68.1%) and use ITN (bed nets) (40%) so they will always Stay under bed nets (40%). They Can assemble ITN and assist others (73%) and will encourage others to adhere to treatment (73%).

Behavioral skills (Tables 4.7) were measured on a scale of 36 points and scored a mean of 30 (0.2) ±3.2, representing 83.3% of the maximum score (high level of Behavior skills) (see Table 4.9). For this variable, secondary and tertiary educational holders reported higher mean scores of 30.1(0.24)3.1 and 30.1(0.26)3.2 respectively.

3.5. Level of Adherence to Malaria in Pregnancy Prevention (MIPP)-Information:

This section consisted of 9 items Self-Reported adherence measured on a 45-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, (42.6%) of the respondents reported not forgetting to take their recommended IPTP medications, 38.1% do not forget to attend ANC, 67.8 seek counsel from health care provider about their medication when travelling and taking their IPTP Medication even when they think they feel fine, better or worse when they took it (35.9%). The frequency distribution for self-reported adherence is found in Table 6.

Self-Reported Adherence on a maximum scale of 45 points reported a mean score of 27.1 (0.3) ± 5.0 at 60.2% of the scale of measurement. This revealed that Adherence to IPTP-SP-related information and Medication instructions was above average levels. However, from this study, respondents achieved an adherence prevalence rate of 60.2% away from the minimum adherence rate of 95%. A summary of Descriptive statistics for the analysis of variables is shown in Table 7. The level of adherence was reported higher with a mean score of 28.0(0.75)6.7 amongst the higher educational holders.

4. Discussion of Results:

Respondents were of childbearing age, who have experienced Cyesis and are thus of the mature category. They have listened to health teaching and counseling about Intermittent Preventive Treatment of malaria in pregnancy at the Antenatal care clinics. They are prone to malaria in pregnancy because they are vulnerable groups (Kabbale, 2013). They have reached the age of accountability and could give reasonable responses. The majority of them were married and it is believed that husbands and family members served as a strong support for medication adherence. Fulani ethnic groups constituted the majority with the highest number of responses, most of them were of the Islamic faith. This could be because most Fulani Islam is polygamists who may marry up to four wives and also have a belief that their women should multiply their population by generous births to populate Islam. A great number were self-employed tertiary education holders.

In this study, most of the respondents received information about malaria infection, transmission, signs and symptoms, effects on the fetus, vulnerable groups, and prevention. Other information received by the women includes treatment of malaria, adverse side effects of the drugs on the fetus, when to take anti-malaria medication, benefits of the treatment and appointment keeping with a health care provider, including the danger of self-medication and use of long-lasting insecticide-treated nets. A similar finding involving two cross-sectional surveys by Mdetele, Aliyu, Winifrida & Kidima (2017) reported that most of the participants had adequate information about IPTp-SP as malaria in pregnancy control intervention. However, in the same study, about 49% did not know the recommended dosage required to be taken during pregnancy to control malaria and 83.5% did not know the effect of malaria during pregnancy

The level of information in this study was however high, which is similar to the survey findings of Pibini & Chiegil (2021) that revealed high information levels amongst pregnant women attending ante-natal clinics. Atulomah (2015) suggests that the right kind of information is given correctly and precisely to pregnant women to increase their awareness and knowledge of intermittent preventive treatment of malaria in pregnancy. Fisher and Harman (2003) also noted that information is a necessary ingredient for modeling or building behavioral skills for adherence to the treatment of malaria in pregnancy. Diarrra (2013) also observed that adequate information is directly proportional to the practice of preventive behaviors such as the effective use of insecticide-treated nets. To Diarra, this will lead to a drop in infant and child morbidity and mortality by 17-33% so the midwife needs to educate the women to clear the myths or misconceptions they hold (Salomeo, 2017; Bruce, 2013).

In a Randomized Controlled Trial of the Effects of a health education intervention on malaria knowledge, the intervention group was subjected to a 4-hour health information session on malaria by Balami, Said, Zulkefli, Bachok, & Audu (2019) where information significantly increased by 12.75% ($p < 0.001$) increase in total knowledge,

Table 2: Summary of Descriptive Statistics for Respondents in this study (N=404)

Variable	Scale of measure	Mean	SE	SD
Information	22	17.8	0.1	1.9
Comprehension	74	47.6	0.6	12.5
Reported Compre	50	35.1	0.4	8.1
Knowledge	24	12.5	0.3	8.1
Motivation	40	28.4	0.2	3.7
Self-Efficacy	36	30.0	0.2	3.2
Self-Reported Adherence	45	27.1	0.3	5.0

Error of Mean; SE: Standard SD: Standard deviation

Table 3: Mean score comparisons for information, comprehension, motivation, self-efficacy, adherence.

Variables	Scale of measure	Non formal (N=29) **(SE)± SD**	Primary (N=135) **(SE)± SD**	Secondary (N=161) **(SE)± SD**	Higher (N=79) **(SE)± SD**	P-Value
Information	22	17.7(0.39)2.1	17.2(0.16)1.9	17.9(0.13)1.7	18.4(0.24)2.1	0.001
Comprehension	74	45.1(1.62)8.7	44.2(1.02)11	48.9(1.02)12	51.6(1.40)12	0.000
Motivation	40	29.4(0.56)3.0	27.7(0.31)3.6	28.4(0.29)3.6	29.4(0.48)4.2	0.006
Self-efficacy	36	29.6(0.64)3.4	29.8(0.28)3.3	30.1(0.24)3.1	30.1(0.26)3.2	0.228
Adherence	45	26.1(0.65)3.5	26.4(0.37)4.3	27.4(0.38)4.9	28.0(0.75)6.7	0.091

Table 4: Summary of Outcome of Regression Analysis (N=404)

Variables	Behavioral skills		P-Value	Adherence		P-Value
	R	**R^2**		**R**	**R^2**	
Information	0.199	0.040	0.000	0.114	0.013	0.022
Motivation	0.255	0.065	0.000	0.159	0.025	0.001
Behavioral Skills				0.101	0.010	0.042

so they concluded that information was effective in improving knowledge and hence adherence.

Many respondents reported understanding information about malaria infection, transmission, signs and symptoms, effects on the fetus, vulnerable groups, and prevention. Other information understood as reported by the respondents includes treatment of malaria, adverse side effects of the drugs on the fetus, when to take anti-malaria medication, the benefit of the treatment and appointment keeping with a health care provider, danger of self-medication and use of long-lasting insecticide-treated nets. This is similar to a study conducted by the Centers for Disease Control in 2019 to assess how far pregnant women comprehend the information received on intermittent preventive treatment of malaria in pregnancy. In this study, about 323(84.1) women reported understanding malaria transmission, and its effect on pregnant woman and their fetuses. Roll back malaria in 2012 also reported that women need to comprehend information delivered to them about intermittent preventive treatment of malaria in pregnancy during Antenatal clinic (Amoran, 2013), this is because sufficiently understood information can help deter myths and other misinterpretation of the information in a non-therapeutic environment (De Wet, Du Plessis, and Klopper, 2013; Allender and Spratley, 2001). An overall level of comprehension in this study

reported high scores, similar to a study by Pibini & Chiegil (2021). In this survey, the level of comprehension was considered on a 40-point scale and reported a mean score of 33.2, a standard error of 0.43, and a Standard deviation of 8.43, a high level of comprehension.

Comprehension consisted of two sub-variables, self-reported and knowledge where respondents reported a high level of understanding of information delivered to them about malaria and its prevention, its transmission, effects on mother and fetus, and return follow-up or scheduled ANC visits. This was confirmed by a test of knowledge with an above-average score. This showed that a few respondents exaggerated their reports of comprehension. However, the result of a similar study reported by Bello, & Oni (2020), who evaluated respondents' Knowledge of the Current.

4.1. ***Recommendation of Intermittent Preventive Treatment in Pregnancy in South-Western Nigeria reported that about 61.9% were short of correct knowledge:***

The pregnant women were motivated by the provision of privacy, respect, and other forms of support. They were offered free insecticide-treated bed nets including IPTP drugs without cost. Incentives were given by the midwives for adherence including other forms of assistance and social support with good ANC infrastructure. Several studies support these findings, reporting short, clear, appealing, straight to the point and motivational information with incentivization for acting out recommended behaviors with handshakes, approval gestures and gifts such as detergents, soap, magi cubes, mosquito nets, free doses of sulphadoxicine pyrimethamine, and free meals/ snacks could inspire the clients to desire to keep to clinic appointments and treatment instructions (Latham, 2012). Behaviors such as immunization completion for self and children, and completion of the second dose of sulphadoxine-pyrimethamine (Gary, 2012). Delivery fee subsidies and free immunizations could encourage clients to turn out in mass including social support from spouses, community, and religious groups (Nduka, 2011) including encouragement, transportation, and financial and material support from husbands and other family members (Becker, 2006). Use of skilled and qualified midwives with good attitudes (Uzochukwu, 2012), patient, polite, and kind approach, passion for the work with listening ears, friendly environment with good infrastructure, clean and aesthetic, and short distance from the community (Handson, 2012). Motivation for this sample (N=404) reported 71% of the maximum score, a high level of motivation which is similar to a Nigeria survey by Chiegil-Solomon and Atulomah (2014). In the same study, Incentives and Reinforcements reported inadequate levels even though Motivation in this study was a strong predictor of adherence, and a positively significant relationship was statistically found between motivation and adherence to information among participants.

Most of the participants were determined to keep to all treatment guidelines, cannot miss clinic appointments, keep to, or obey all counseling information, stay under or use ITN bed nets, assemble and assist and encourage others to adhere to treatment, and always consult midwives for advice. This shows that their capability assurance was high, they considered

difficulties as challenges and stepping stones to success rather than considering them as threats to be avoided. Evidence supports this and shows that self-efficacy is a positive predictor of behavior practice and influences the amount of stress and barriers that people experience as they try to engage in positive behavior practice (Doménech-Betoret, Abellán-Roselló and Gómez-Artiga, 2017). The behavioral skills of the respondents were high levels. They were mostly of secondary and tertiary education qualifications and reported higher mean scores compared to lower educational holders.

A Taraba Nigeria study of HIV-Information Comprehension and Adherence by Chiegil-Solomon and Atulomah (2014) reported an above-average level of Self-Efficacy. This is supported by a systematic review of the relationship between self-efficacy, health locus of control, and medication adherence by Náfrádi,

Nakamoto, & Schulz (2017). It reported that adherence promotion was consistent with High levels of self-efficacy and Internal Health Locus of Control. Huang, Shiyanbola & Smith (2018) further studied the association between health literacy and treatment self-efficacy and adherence and reported that Self-reported health status was positively associated with behavioral adherence to treatment. These findings were yet supported by a study of Mediating Effect of Self-Efficacy on the Relationship Between Medication Literacy and Medication Adherence with more supporting evidence to consolidate this claim. In this study, a total of 60.9% of patients were low-adherent to their recommended treatment regimens. however, Self-efficacy maintained a significant positive correlation with medication literacy and medication adherence so Self-efficacy accounted for 28.7% of the total contribution to medication adherence (Shen, Shi, Ding, & Zhong (2020).

In this study. most pregnant women adhered to their treatment; do not miss or forget to take their malaria medicines or treatments, reduce the dosage of prescribed medication, do not forget to attend ANC, Seek advice from HC provider about their drugs when travelling, Do not stop drugs on their own even when they feel better, Do not consider ANC attendance as an inconvenience, Do not have difficulty remembering drugs taking, Are not too busy to remember Rx instructions and Treatment instructions do not conflict with religion and/ or culture. In Ghana, a similar study about adherence to the new intermittent preventive treatment of malaria in pregnancy policy in the Keta District of the Volta region reported that about 82.1% of participants adhered to the recommendations of WHO policy of at least three doses of IPTp-SP. However, for Ghana's five-dose coverage, only 17.1% received recommended regimen (Vandy, Peprah, Jerela, Titiati, Manu, Akamah, Maya, & Torpey, 2019)

Self-Reported Adherence for this study reported an above-average level. However, from this study, respondents achieved an adherence prevalence rate of 60.2% away from the minimum adherence rate of 95%. A similar Abakaliki study in southeastern Nigeria by Onyebuchi, Lawani, Iyoke, Onoh, & Okeke (2014) reported that there were varying extents of inadequate adherence to IPTP information and medication adherence. This result is significant because it showed that medication adherence was below the optimal level required to control malaria in pregnancy and is consistent with findings from other studies which puts medication adherence at between 30% and 78% (DiMatteo, 2004; Viswanathan et al, 2012).

5. Conclusion:

This study examined the problems of malaria prevention and revealed the importance of the inculcation of motivational components in the prevention of malaria in pregnancy. It is therefore recommended that motivational components should be strengthened to further strengthen recommended adherence to malaria prevention measures in pregnancy.

6. Recommendations:

These are the recommendations drawn from the results of this study.

- Government should invest in information dissemination to all childbearing women about the treatments, prevention, and control of malaria
- Midwives in Antenatal care clinics, health workers, and Non-Governmental Organizations should embark on sharing correct, clear, and comprehensive information on IPTP.
- Skilled attendants such as nurses and midwives should be empowered in the task of service delivery, leadership, and supervision to mentor and supervise other health workers working with them.
- Adequate motivation should be accorded nurses and midwives through incentives and commensurate remuneration.
- Community effort should be inspired on environmental sanitation, stagnant water eradicated, and/ or putting oil or kerosene on stagnant water should be encouraged

- Stakeholders in the community should collaborate with non-governmental organizations, community-based organizations, and faith-based organizations to provide mosquito nets sp-sulphadoxine pyrimethamine in the rural area 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.
- Active community engagement and participation should be fostered by involving community and religious leaders in sanitation activities and control of vectors

7. Limitations of the study:

A major constraint that militated against this study was time constraints, given the very tight schedules in the course of the study. There might have been recall and social desirability bias from respondents and the absence of Pills count might have influenced the objectivity of the respondents. A major challenge was also a possible disguise in the translational meaning of the questions by the research assistants which was addressed during the training.

8. Bias:

Questionnaire items were carefully framed in a clear, concise, and neutral way to avoid the expression of personal opinions. Items were reviewed and revised adequately so that they are simple to understand to avoid misinterpretation. Random selection was also adopted so that all participants had equal chances of being selected

9. Acknowledgement:

Thanks to all who contributed in one way or the other to the success of this work

10. List of abbreviations:

ANC: Antenatal Care
AIDS: Acquired Immuno-Deficiency Syndrom
CDC: Center for Disease Control
WHO: World Health Organization
LLINs long-lasting insecticidal nets
IPTp Intermittent preventive treatment in pregnancy
SP sulfadoxine-pyrimethamine
IPTp intermittent preventive treatment in pregnancy
IPTi Intermittent preventive treatment of malaria in infancy
UNDP: United Nations Development Programme
MIPP Malaria in Pregnancy Prevention
DOT: Directly observed treatment
HBSAg: Hepatitis B
HCV: Hepatitis

11. Publisher details:

Publisher: Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256775434261
Location: Wisdom Centre, P.O.BOX. 148, Uganda, East Africa.

12. References:

1. Arroz JAH (2017). Social and behavior change communication in the fight against malaria in Mozambique. Rev Saude Publica. 2017; 51:18
2. Atulomah N.O. (2015). Effects of two health education interventions on adherence to anti-hypertensive medication and on blood pres-

sure in selected tertiary health facilities in Southwestern Nigeria

3. Ayoola, T. J. (2011). Gas flaring and its implication for environmental accounting in Nigeria. *J of Sust Dev*. 4(5), pp. 244-250.
4. Badirou A., Georgia D.B., Géraud Roméo P.S., Luc K.M., and Marius O.E. (2018). Adherence to intermittent preventive treatment of malaria in pregnancy with sulfadoxine pyrimethamine and associated factors: A cross-sectional survey in Benin's Public Hospitals. *Regional Institute of Public Health (IRSP)*, Calavi, Ouidah, Bénin
5. Bbosa, R. S., & Ehlers, V. J. (2017). Midwives' provision of antimalaria services to pregnant women in Uganda. *Midwifery*, *47*, 36–42. https://doi.org/10.1016/j.midw.2017.02.006
6. Brieger B. (2022). Supporting Midwives to prevent malaria on international day of the midwife http://malariamatters.org/supporting-midwives-to-prevent- malaria-on international-day-of-the-midwife/
7. Balami, A. D., Said, S. M., Zulkefli, N., Bachok, N., & Audu, B. (2019). Effects of a health educational intervention on malaria knowledge, motivation, and behavioural skills: a randomized controlled trial. *Malaria journal*, *18* (1), 41. https://doi.org/10.1186/s12936-019-2676-3
8. Bello, O. O., & Oni, O. (2020). Health workers' awareness and knowledge of current recommendation of intermittent preventive treatment in pregnancy in South Western Nigeria. *Ethiopian j of h. sc.*, *30* (1), 125–134. https://doi.org/10.4314/ejhs. v30i1.16
9. Becker B.E, Huselid M.A. (2006). Strategic human resources management: 32 (6). https://doi.org/10.1177/0149206306293668
10. Björkman, A., Shakely, D., Ali, A. S., Morris, U., Mkali, H., Abbas, A. K., Al-Mafazy, A. W., Haji, K. A., Mcha, J., Omar, R., Cook, J., Elfving, K., Petzold, M., Sachs, M. C., Aydin Schmidt, B., Drakeley, C., Msellem, M., & Mårtensson, A. (2019). From high to low malaria transmission in Zanzibar-challenges and opportunities to achieve elimination. *BMC medicine*, *17* (1), 14. https://doi.org/10.1186/s12916-018-1243-z
11. Burrows, J. N., Duparc,S., Gutteridge, W. E., Hooft van Huijsduijnen, R., Kaszubska, W., Macintyre, F., Mazzuri, S., Möhrle, J. J., & Wells, T. (2017). New developments in anti-malarial target candidate and product profiles. *Malaria journal*, *16* (1), 26. https://doi.org/10.1186/s129360161675-x
12. Challenger, J. D., Bruxvoort, K., Ghani, A. C., & Okell, L. C. (2017). Assessing the impact of imperfect adherence to artemether-lumefantrine on malaria treatment outcomes using within-host modelling. *Nature communications*, *8* (1), 1373. https://doi.org/10.1038/s4 1467-017 01352-3
13. Center for Disease Control and Prevention (CDC) (2016). Impact of malaria. https://www.cdc.gov/malaria/malaria_worldwide/impact.html.
14. CDC (ND). How can malaria cases and deaths be reduced? CDC24/7. https://www.cdc.gov/malaria/malaria_worldwide/reduction/index.html
15. Chiegil-Solomon and Atulomah, N.O. (2014). HIV-information comprehension, motivation to adhere and adherence amongst ANC clinic attendees in selected Secondary Hospitals in Taraba State. Unpublished monograph.
16. Dhiman & Sunil (2009). Malaria control: Behavioural and social aspects. *Defence Science journal*. http://ir.library.ui.edu.ng/bitstream/123456789/648/1/Nnodimele%20Onuigbo %20ATULOMApd
17. Doménech-Betoret F., Abellán-Roselló L., and Gómez-Artiga A. (2017) Self-Efficacy, Satisfaction, and academic achievement: The mediator role of students' expectancy value beliefs. *Front. Psychol*. 8:1193. doi:10.3389/fpsyg.2017.01193
18. Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS-risk behavior. Psychological Bulletin, 111(3), 455 474. https://doi.org/10.1037/0033-2909.111.3.455

19. Fylkesnes K., Sandøy I.F., Jürgensen M., Chipimo P.J., Mwangala M., Michelo C. (2013). Strong effects of home-based voluntary HIV counselling and testing on acceptance and equity: A cluster randomized trial in Zambia, Social Science & Medicine, 86 (2013) 9 16, ISSN 0277-9536, https://doi.org/10.1016/j.socscimed.2013.02.036. (https://www.sciencedirect.com/science/article/pii/S0277953613001299
20. Gary M.S., Wood R.E., Pillinger T. (2012). Enhancing mental models, analogical transfer, and performance in strategic decision making. 33 (11) 1229-1246 https://doi.org/10.1002/smj.1979
21. **G**lobal Fund to fight against AIDS (2019), Tuberculosis and malaria; Nigeria funding request malaria 2017. https://www.theglobalfund.org/en/malaria/
22. Harrison N.E., Olufunlayo T.F., Agomo C.O. (2012). Utilization of the current national antimalarial treatment guidelines among doctors in army hospitals in Lagos, Nigeria Open Journal of Preventive Medicine 2 (3) DOI: 10.4236/ojpm.2012.23056
23. Hiwat, H., Martínez-López, B., Cairo, H., Hardjopawiro, L., Boerleider, A., Duarte, E. C., & Yadon, Z. E. (2018). Malaria epidemiology in Suriname from 2000 to 2016: trends, opportunities and challenges for elimination. *Malaria journal*, *17* (1), 418. https://doi.org/10.1186/s12936-0182570-4
24. Hill J., Hoyt J., van Eijk A.M., D'Mello-Guyett L., ter Kuile F.O., Steketee R., Smith H., Webster J. (2013). Factors affecting the delivery, access, and use of interventions to prevent malaria in pregnancy in Sub-Saharan Africa: A Systematic Review and Meta Analysis. https://doi.org/10.1371/journal.pmed.1001488
25. Huang, Y. M., Shiyanbola, O. O., & Smith, P. D. (2018). Association of health literacy and medication self-efficacy with medication adherence and diabetes control. *Patient preference and adherence*, *12*, 793 802.https://doi.org/10.2147/PPA.S153312
26. Iriemenam, N. C., Dosunmu, A. O., Oyibo, W. A., & Fagbenro-Beyioku, A. F. (2011). Knowledge, attitude, perception of malaria and evaluation of malaria parasitaemia among pregnant women attending antenatal care clinic in metropolitan Lagos, Nigeria. *Journal of vector borne diseases*, *48* (1), 12–17.
27. Kwiatkowski D. P. (2005). How malaria has affected the human genome and what human genetics can teach us about malaria. *American journal of human genetics*, *77* (2), 171 192. https://doi.org/10.1086/432519
28. Latham G.P. (2015). Work motivation: History, theory, research, and practice. SAGE Publications, Inc., Organizational Behavior, Organizational Psychology DOI: http://dx.doi.org/10.4135/9781506335520
29. Lee, H., & Park, H.J. (2013). Testing the impact of message interactivity on relationship management and organizational reputation. Journal of Public Relations Research, 25(2), 188-206. *J. of Public Relations Res*. 25. 188-206. Outcomes of a Suicide Prevention Gatekeeper Training Program Among School Personnel
30. Mdetele B. Ayubu, Winifrida B. Kidima (2017) "Monitoring compliance and acceptability of intermittent preventive treatment of malaria using Sulfadoxine Pyrimethamine after Ten Years of Implementation in Tanzania", *Malaria Research and Treatment*, vol. 2017, Article ID 9761289, 5 pages, 2017. https://doi.org/10.1155/2017/9761289
31. Náfrádi, L., Nakamoto, K., & Schulz, P. J. (2017). Is patient empowerment the key to promote adherence? A systematic review of the relationship between self-efficacy, health locus of control and medication adherence. *PloSone*, *12* (10), e0186458. https://doi.org/10. 1371/journal.pone.0186458
32. Nduka, F. O., Nwosu, E., & Oguariri, R. M. (2011). Evaluation of the effectiveness and compliance of intermittent preventive treatment (IPT) in the control of malaria in pregnant women in south eastern Nigeria. *Annals of tropical medicine and parasitology*, *105* (8),

599–605. https://doi.org/10.1179/20477732 11Y.0000000015

33. Newton, P. N., Ward, S., Angus, B. J., Chierakul, W., Dondorp, A., Ruangveerayuth, R., Silamut, K., Teerapong, P., Suputtamongkol, Y., Looareesuwan, S., & White, N. J. (2006). Early treatment failure in severe malaria resulting from abnormally low plasma quinine concentrations. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, *100* (2), 184–186. https://doi.org/10.1016/j .trstmh.2005.01. 008
34. NIDA. (2020). Principles of Effective Treatment. Retrieved from https://www.drugabuse.gov/publications/principles drug-addiction-treatment research-based guide-third-edition/principles-effective-treatment on 2021, June 5
35. Nwe, T. W., Oo, T., Wai, K. T., Zhou, S., van Griensven, J., Chinnakali, P., Shah, S., & Thi, A. (2017). Malaria profiles and challenges in artemisinin resistance containment in Myanmar. *Infectious diseases of poverty*, *6* (1), 76. https://doi.org/10.1186/ s40249 017-0292-4
36. Oaks S.C., Mitchell V.S., Pearson G.W. & Carpenter C.C.J. (editors) (1991). Malaria: Obstacles and opportunities: Washington, DC: National Academy Press, 1991. Xv+309pp.ISBN 0-309-04527-4: [Marketed and distributed in the UK by John Wiley & Sons, Ltd., Chichester]
37. Oladimeji, K.E., Tsoka-Gwegweni, J.M., Ojewole, E. *& Tassi Yuna S.* (2019). Knowledge of malaria prevention among pregnant women and non-pregnant mothers of children aged under 5 years in Ibadan,
38. Onyebuchi, A. K., Lawani, L. O., Iyoke, C. A., Onoh, C. R., & Okeke, N. E. (2014). Adherence to intermittent preventive treatment for malaria with sulphadoxine pyrimethamine and outcome of pregnancy among parturients in South East Nigeria. *Patient preference and adherence*, *8*, 447–452. https://doi.org/10.2147/PPA.S61 448
39. Parmar, Varun Patel, Sangita Iyer, Charoo (2018). Effect of counseling on newly diagnosed Type 2 diabetes mellitus patients visiting a tertiary care hospital: A randomized control trial. ***Indian J of Com Med* ; Chandigarh** 43 (3), 244245. DOI: 10.4103/ijcm.IJCM_61_18
40. Pathickal S., Patel R., and Swaby S (2016). The Importance of Counseling and its Impact on Medication Adherence (5) 5 RHO CHI h ttps://rhochistj.org/RhoChiPost/importanc e counseling-impact-medication-adherence/
41. Pibini A.G. and Chiegil-J.S., et al. (2021). IPTP Information Comprehension and Adherence amongst ANC Clinic Attendees in Takum LGA, Taraba State.
42. Pillay, E., Khodaiji, S., Bezuidenhout, B. C., Litshie, M., & Coetzer, T. L. (2019). Evaluation of automated malaria diagnosis using the Sysmex XN-30 analyser in a clinical setting. *Malaria journal*, *18* (1), 15. https://doi.org/10.1186/s12936-019-2655-8
43. Rudasingwa, G., Cho, SI. (2020). Determinants of the persistence of malaria in Rwanda. *Malar J* 19, 36 (2020). https:// doi.org/10.1186/s12936-020-3117-z
44. Shen, Z., Shi, S., Ding, S., & Zhong, Z. (2020). Mediating Effect of Self-Efficacy on the Relationship Between Medication Literacy and Medication Adherence Among Patients with Hypertension. *Frontiers in pharmacology*, *11*,569092. https://doi.org/10.338 9/ fphar.2020.569092
45. Stoney R.J., Chen L.H., Jentes E.S., Wilson M.E., Han P.V., Benoit C.M., MacLeod W.B., Hamer D.H., and Barnett E.D. (2016) Malaria prevention strategies: adherence among boston area travelers. Am. J. Trop. Med. Hyg., 94(1), pp. 136 – 142 doi:10.4269/ajtmh.15-0565
46. Sutan, R., Berkat, S. (2014). Does cultural practice affect neonatal survival- a case control study among low-birth-weight babies in Aceh Province, Indonesia. *BMC Pregnancy Childbirth* 14 (342). https://doi.org/10.1186 /1471-2393-14-34T

47. tahita, M. C., Tinto, H., Menten, J., Ouedraogo, J. B., Guiguemde, R. T., van Geertruyden, J. P., Erhart, A., & D'Alessandro, U. (2013). Clinical signs and symptoms cannot reliably predict Plasmodium falciparum malaria infection in pregnant women living in an area of high seasonal transmission. *Malaria journal*, *12*, 464. https://doi.org/10.1186/1475-2875-12-464
48. UNDP/World Bank/WHO (ND). The behavioural and social aspects of malaria and its control, Special Programme for Research & Training in Tropical Diseases (TDR) https://www.who.int/tdr/about/seb_malaria.pdf
49. UNDP/World Bank/WHP (ND) and Institute of Medicine (US) Committee for the Study on Malaria Prevention and Control, Oaks, S. C., Jr., Mitchell, V. S., Pearson, G. W., & Carpenter, C. (Eds.). (1991). *Malaria: Obstacles and Opportunities*. National Academies Press (US).
50. Vandy, A. O., Peprah, N. Y., Jerela, J. Y., Titiati, P., Manu, A., Akamah, J., Maya, E. T., & Torpey, K. (2019). Factors influencing adherence to the new intermittent preventive treatment of malaria in pregnancy policy in Keta District of the Volta region, Ghana. BMC pregnancy and childbirth, 19(1), 424. https://doi.org/10.1186/s12884-019-2544 8
51. Wurtz N., Pascual A., Marin-Jauffre A., Bouchiba H., Benoit N., Desbordes M., Martelloni M., Pommier de Santi M., Richa G., Taudon N., Pradines B. & Briolant S. (2012). Early treatment failure during treatment of *Plasmodium falciparum* malaria with atovaquone proguanil in the Republic of Ivory Coast. *Malar J* 11, 146 (2012). https://doi.org/10.1186/1475-2875-11-146
52. WHO (2017). Mass drug administration for falciparum malaria: a practical field manual. WHO, ISN:978-924-151310-4
53. WHO (2020) Malaria key facts. https://www.who.int/news-room/fact-sheets/detail/malaria
54. WHO (2014) WHO policy brief for the implementation of intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP). https://www.who.int/malaria/publications/atoz/iptp-sp-updated-policy-brief 24jan2014.pdf
55. WHO (2019). Intermittent preventive treatment in pregnancy (IPTp), retrieved 30/1/21 from https://www.who.int/malaria/areas/preventive_therapies/pregnancy/en/

Author biography

Dr Solomon Joseph Chiegil Doctor of public Health, Global Healthplus Public Initia- tive, Nigeria, globalhealth.initiative@yahoo.com; +2348087747272

Rachael Abeh Sani Head of Department, Human Simulation Studies, College of Nursing Science, Jalingo, Taraba State

Iranum Nimiruna Dean, School of Midwifery, College of Nursing Science, Jalingo.

Uriah Danladi College of Nursing Science, Jalingo, Taraba State

Mercy Umeh Orji Global Healthplus Public Initiative, Nigeria.

Akilu Hamza Head of Department Applied Sciences, Taraba State College of Nursing, Jalingo.

Grace Christopher Tanko Danjuma Clinical services, College of Nursing Science, Jalingo.