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Compliance with Intermittent Presumptive Treatment and Insecticide Treated Nets Use During Pregnancy in Enugu State, Nigeria

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Abstract To identify key socio-demographic and knowledge factors associated with compliance with recommended use of commodities for preventing malaria in pregnancy (MIP) in Enugu State, Nigeria. Cross-sectional study of 720 women who delivered within 6 months preceding the survey in three local government areas in Enugu State was conducted using a structured questionnaire. About half (51.6 %) of the women used IPTp1 while 25.9 % took IPTp2 as recommended during their most recent pregnancy. Forty-one percent of the women slept under insecticide treat nets (ITN) during the most recent pregnancy but only 15.4 % did so as recommended every night. Socio-demographic and knowledge factors associated with compliance were identified. Compliance with intermittent presumptive treatment in pregnancy (IPTp) recommendation was more common among those in the rural setting (26.9 %) compared to the peri-urban (20.3 %) and urban (17.3 %) ($P = 0.032$). Those with good knowledge of the causes, effects and prevention of malaria during pregnancy complied more (23.7 %) than those with poor knowledge (17.0 %) ($P = 0.020$). With respect to sleeping under ITN, more of those with post secondary education, good knowledge of MIP and currently living with a partner used ITN every night during the last pregnancy. Knowledge about the MIP issues and having a partner influence compliance with relevant preventives. Efforts to increase compliance with recommended practices to prevent MIP should focus on providing health education to pregnant women and their partners, who reinforce what the women are told during antenatal care. More qualitative studies need to be conducted on this subject.

Keywords Compliance · Malaria · Pregnancy · Treatment · Prevention

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Introduction

Malaria in pregnancy (MIP) remains a major health challenge in most of Africa, where malaria constitutes the most important parasitic infection, despite the availability of simple, cheap and effective interventions. Each year, thirty million pregnancies are threatened by malaria in endemic countries throughout Africa [1, 2]. MIP is a major risk factor for mothers and their babies. Mothers are substantially more susceptible to complications from malaria [3, 4], and increased risk to the child from miscarriage, stillbirth and low birth weight (LBW) which is a high risk factor for death in the first 7 days of life [5]. LBW is closely associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life [6, 7].

Mortality range associated with MIP can vary 100-fold across the spectrum of birth weight and rises continuously with decreasing weight [8]. MIP is also reported to have links with intra-uterine growth retardation [9]. MIP is estimated to cause up to 15 % of maternal anemia and about 35 % of preventable LBW as well as neonatal mortality [7]. Malaria induced LBW is responsible for between 3 and 17 deaths per 1,000 live births [10]. Guyatt and Snow [11] estimated that MIP caused 11.4 % of neonatal deaths and 5.7 % of infant deaths in malaria-endemic

areas of Africa, resulting in approximately 100,000 infant deaths per year.

Malaria is endemic throughout Nigeria currently accounting for nearly 110 million clinically diagnosed cases per year [12]. It is estimated to account for 11 % of maternal mortality and 12–30 % of mortality in <5 children (FMOH [13, 14]). MIP prevalence from health facility records in Nigeria is estimated at 48 % . The actual figure could be more, considering that 40 % of women do not use the health facilities for antenatal care in Nigeria [15]. The strategic framework for malaria prevention and control during pregnancy in areas of stable malaria transmission (Africa Region) include use of intermittent presumptive treatment (IPT) and insecticide treated nets (ITNs).

A meta-analysis of intervention trials suggests that successful prevention of the infection reduces the risk of severe maternal anemia by 38 %, low birth weight by 43 % and perinatal mortality by 27 % among paucigravidae. Garner and Gulmezoglu [16] estimate that effective prevention of malaria with IPT reduces the risk of low birth weight by as much as 43 %. Specifically, WHO's Focused Antenatal Care (FANC) approach in malaria endemic areas recommend that each pregnant woman receives a minimum of two treatment doses of sulphadoxine-pyrimethamine (SP) after quickening at monthly intervals as IPT in pregnancy (IPTp). The Roll Back Malaria (RBM) initiative targets 100 % coverage of pregnant women with IPTp in areas of high transmission by 2010 [17].

However, studies show that among 39 countries with an IPTp policy only 25 % of pregnant women had received some IPTp among the nearly 28 million pregnancies at risk of malaria, despite the intense campaign for IPTp [17]. The apparent gap between low coverage with IPTp, suggesting missed opportunities for coverage and the attainment/maintenance of high coverage of IPTp remains challenging. This is true of Nigeria, where only 13.2 % took IPTp2 during their last pregnancy [2].

On the other hand, use of ITNs has not only remained one of the most important of all measures of protection against malaria, it has become the single most dependable intervention available when properly used. ITNs are a low cost and highly effective way of reducing the incidence of malaria in people who sleep under them and they have been conclusively shown in a series of trials to substantially reduce child mortality in malaria endemic areas of Africa. ITNs are also efficacious in reducing maternal anemia, placental infection and low birth weight [18]. In a study of effects of the use of ITNs on birth outcomes in Southeast Nigeria, Igwe et al. [19] noted that malaria during pregnancy is also a significant drain on its economy and a major financial burden to the poor.

Unfortunately, effective access to these ITNs is poor among the majority of pregnant women in Nigeria. In Enugu State, for instance, the NPC and ICF Macro reports that only 9.7 % of the households surveyed had at least one net while only 3.9 % of the pregnant women slept under a treated net [15].

The principal factors associated low up-take of IPTp2 and ITNs in Enugu State, Nigeria need more exploration. These could include a number of socio-cultural factors as well as low utilization of ante natal clinic (ANC) services among Nigeria women compared to women in other African countries and also the lack of MIP services existing in Ante natal clinic's program [20]. On the other hand, the reasons may extend to a number of personal and logistic issues confronting pregnant women, as well as provider issues. Experienced health worker shortages and weak health systems have led to a lack of preventive and curative health care services and health promotion programmes, making it unlikely that the world's poorest countries can achieve the Millennium Development Goals [21, 22].

Beyond these issues, there may be other fundamental issues linked with compliance to medical prescriptions. Compliance studies on other medical conditions have shown that adhering to a medical regimen may be influenced by the characteristics of the patient/client and provider as well as the nature of the regimen and may guide thinking about compliance with ivermectin treatment. Patient factors often include ethnic origin [23]. Educational level has a positive association with compliance [24].

Similarly, there are factors that encourage or discourage use of health commodities to prevent illness. These may include age, gender and ethnicity [25–28]. Social support and drug perceptions are other factors that have been found to influence drug uptake, and hence may impact on compliance [29]. Akogun et al. [30] discussed the importance of perceived benefits of treatment, which could be another motivating factor in compliance. These factors may or may not explain compliance with IPTp2 prescriptions during pregnancy. Scientific evidence on these is thus needed as a basis to frame health education and communication that will promote uptake of IPTp2 during pregnancy to reduce malaria related mortality during pregnancy.

This paper presents results of a study to explore the socio-cultural correlates of compliance with MIP preventive technologies, IPTp and ITN. The main aim was to identify the factors associated with levels of compliance among pregnant women with varying socio-demographic characteristics and perceptions.

Methods

Study Design

This study is a cross-sectional survey developed to specifically investigate those social and cultural factors that

affect malaria prevention among pregnant women in Enugu State. This research was designed to obtain from a sample of pregnant women in Enugu, the factors that affect the use of these preventive methods. Since it is not possible to collect information from all pregnant women in Enugu State, given the available resources, time and other constraints, data was collected from a random sample of pregnant women in the study area.

Study Area

The locale for this study is the capital of Enugu State, Enugu Urban. The people of Enugu Urban belong largely to the Igbo ethnic group, which is one of the three largest ethnic groups in Nigeria. The name 'Enugu' comes from two Igbo words "enu ugwu" or "top of the hill". The city's slogan is "perpetual apex pride". Nicknamed the "coal city" in the early 1900s, Enugu was a major center for the mining of coal but since the civil war, coal production has declined almost to a halt. Thus in recent years the city's economy has diversified and is largely dominated by trading, commerce and small scale industry.

The major health care facility in Enugu urban is the Enugu State University Teaching Hospital and College of Medicine. There are also numerous private, missionary and government owned hospitals and clinics.

Enugu urban has three local government areas (LGA); Enugu South, Enugu East, and Enugu North (which is the major business district). An LGA is the third level political and administrative division in the country. Over the years, Enugu urban has grown enormously especially in areas of commerce, estate and health facilities. However, the three LGAs differ in socioeconomic development. Enugu North is the most urban among the three. It is the political and administrative capital of Enugu State. It is populated mainly with civil servants from all walks of life. Enugu East (peri-urban) is less developed with some rural characteristics. However, some of the urban influences from Enugu North are felt in this LGA. Enugu South, on the other hand is more rural than urban. In this study it was taken as the rural, where the rural community was taken. The major occupation of the people is farming and petty trading.

Study Population

According to the National Population Commission (NPC) final census results of 2006, the total population of Enugu State is 3.3 million and Enugu urban (Enugu East, Enugu North and Enugu North LGAs) accounts for 22 % of this population. The population of Enugu urban is distributed among the three LGA selected for this study; Enugu North-242,140, Enugu South-198,032, Enugu East-277,119. The total population of women in these LGA also projected by NPC is estimated at 373,424 with Enugu North having 123,245, Enugu South 104,274, and Enugu East 145,905. Given the fertility of about 5.7 per woman and the population of women of children bearing age, it was estimated that 36,133 women will be pregnant in the three study LGAs within a year and this constituted the target population for this study [31].

Sample Size and Sampling Technique

Using an ITN usage rate among pregnant women in Enugu State and confidence interval of 95 % with an estimated 2 percentage level of precision, a sample size of 360 respondents was computed. This was doubled to cater for cluster effects in the sampling to get 620 respondents [31].

A multi stage sampling technique was employed in this study to communities and pregnant women. First a list of all health facilities in the study LGAs (Enugu East, Enugu North and Enugu South) was compiled. All PHCs providing ANC services in the list were identified. The communities surrounding each PHC were identified and listed. The communities were taken to represent the catchment communities for the activities of the PHCs. From the list of the catchment communities surrounding each PHC, two communities were randomly selected to form the sampling clusters from which eligible (pregnant women) respondents were drawn.

A central location in each of the randomly selected community was identified and it served as the starting point for data collection in the selected community. Two data collectors were assigned to cover each community cluster. The interviewers moved in opposite directions from the identified starting point in each cluster. Interviewers continued to turn right at any junction until the desired number of respondents was attained. The interviewers visited every dwelling unit and households enlisting women with the study characteristics. On occasions where the number required in any cluster was not reached, interviewers moved into an adjacent community to complete the number.

Instruments and Methods of Data Collection

A structured interview schedule (other-administered questionnaire) was employed for data collection in this study. It was used for data collection from pregnant women enlisted in this study. This instrument covered the household and socio-demographic characteristics of the women, their pregnancy and ANC experiences. It also collected information on the knowledge of some health problems during pregnancy as well as measures for preventing such health problems as MIP.

The instrument was administered by carefully selected field assistants who were trained on the objectives and methods of the study. They visited the selected women in their homes and administered the interview.

Method of Data Analysis

The data were computer entered into carefully prepared data template with check programme using Epi Info version 6.04 and transferred to SPSS version 19 for the actual analysis. Simple descriptive statistics were employed in characterizing the data. Correlation analysis was also conducted using non-parametric statistics like Chi square (χ^2) to illustrate the relationship between certain socio demographic variables, knowledge of MIP and compliance with recommended two doses of SP and sleeping under ITN every night during pregnancy to prevent MIP.

Ethical Considerations

Ethical approval was obtained through the Health Research Ethics committee of the University of Nigeria Teaching Hospital. Informed consent of the respondents was sought and received before interview commenced.

Results

The women were aged between 16 and 43 years with mean age of 28.7 years (28.7 ± 4.41 SD). Over ninety percent (97.9 %) of the women were married or in union. All (100.0 %) had attended school. More than half (60.4 %) were engaged in paid employment. The clinics were within 2 km of the communities/homes. The respondents recorded 3.45 ANC visits on the average (3.45 ± 2.61 SD).

Principal component analysis is used to compute an asset index, and used to divide households into five asset quintiles. This was based on possession of items such as refrigerator, motorcycle and radio. The asset index was adapted from the standardized asset index used for the Nigeria Demographic and Health Survey. It contained 11 household items, namely whether the household had access to electricity; landline telephone; refrigerator; radio and television. Other items include cell phone; bicycle; motorcycle, motor car, tractor and livestock. There was a normal distribution around the second quintile (49 % of respondents) and a steady increase in IPTp2 compliance with increasing wealth (from 20.4 % to 29.5 %). Sleeping under insecticide treated net (ITN) every night during pregnancy also increased with wealth (25 % to 50 %).

The respondents' knowledge of malaria was examined. Almost everyone interviewed indicated awareness of malaria. Malaria was presented as a very fearsome problem, which overwhelmed the people. Over ninety percent (91.7 %) mentioned mosquito bites as a cause of transmission. They showed some knowledge on the effects of malaria on pregnant women (e.g. miscarriage, prematurity), what they could do to prevent malaria during pregnancy, which included taking SP and using ITNs, and the need for prompt treatment. These knowledge factors were combined into a 10-point score with 61.8 % scoring 5 and above. There was one item on cause of malaria, seven items on its effect both on mother and foetus/child and 2 items on prevention.

More than half (51.6 %) of the respondents used SP during their most recent pregnancy for the prevention of malaria, but only 25.9 % took IPTp2 as recommended. Similarly, 41.0 % slept under ITN during their most recent pregnancy but only 15.4 % did so every night of the pregnancy. Table 1 presents univariate comparison in compliance with the recommended two doses of SP for IPTp and sleeping under ITN every night, respectively, across the demographic and knowledge factors.

Compliance with recommended IPTp was better among women in the rural LGA than the urban and peri urban ($P = 0.032$), wealthier ($P = 0.046$) and those with higher knowledge of malaria transmission and prevention ($P = 0.020$). On the other hand, the use of ITN every night during pregnancy was more among those currently living with partners (23.3 %; $P = 0.007$); those with post secondary education (27.9 %; $P < 0.001$); and among those with good knowledge of malaria transmission and prevention (25.5 %; $P = 0.005$). Half or more (≥50.0 %) of those in the third, fourth or fifth quintile used ITN every night during the last pregnancy. This compares with 6.5 % and 19.0 % in the first and second quintile respectively that slept under ITN every night during the last pregnancy. The difference was statistically significant at $P < 0.001$ level.

The factors which correlated significantly with compliance with recommended IPTp and ITN use univariate comparison were included in logistic regression models to predict the factors that most influence compliance. The regression analysis identified factors associated with compliance to two doses of SP for IPTp and sleeping under ITN every night in the sample (Tables 2, 3). One demographic factor, namely, being in the more rural LGA showed positive associations with compliance to two doses of SP for IPTp. Being knowledgeable in malaria—its causes, effect in pregnancy and prevention also had positive association with compliance to two doses of SP for IPTp.

With respect to sleeping under ITN every night during the last pregnancy, the regression results showed that beign knowledgeable and three demographic factors were associated positively with compliance to sleeping under ITN every night during pregnancy. The demographic factors included living with a partner, being wealthy and having post secondary education.

Table 1 Factors influencing compliance with recommended two doses of SP and sleeping under ITN every night during pregnancy

Factor	Category	Number	IPTp2			ITN use		
			% compy	χ^2	*P* value	% compy	χ^2	*P* value
Local government areas	Enugu East	227	20.3	6.908	0.032	20.3	1.037	0.595
	Enugu North	266	17.3			22.6		
	Enugu	227	26.9			24.2		
Age	15–19	9	22.2	7.408	0.192	22.2	6.096	0.297
	20–24	104	20.2			18.3		
	25–29	332	17.5			21.7		
	30–34	195	25.6			24.6		
	35–39	70	28.6			28.6		
	40–44	10	20			0		
Marital status	Ever married	709	21.2	0.242	0.623	22.6	1.133	0.255
	Never married	11	27.3			9.1		
Currently living with partner	Yes	678	20.8	1.329	0.158	23.3	5.95	0.007
	No	42	28.6			7.1		
Level of education	High	471	22.7	1.753	0.109	29.7	42.528	<0.001
	Low	249	18.5			8.4		
Work for pay?	Yes	435	22.3	0.722	0.225	22.8	0.1	0.412
	No	285	19.6			21.8		
Wealth quintile	Lowest	231	15.2	9.692	0.046	6.5	136.103	<0.001
	Second	353	25.5			19		
	Middle	86	22.1			57		
	Fourth	48	18.8			60.4		
	Highest	2	0			50		
Number of ANC visits	1−2	196	16.3	2.721	0.256	20.4	0.784	0.676
	3−4	163	20.2			23.9		
	5+	257	20.6			23.3		
Knowledge of malaria	Poor (0–4)	265	17.0	4.566	0.02	17.0	6.991	0.005
	Good (5+)	455	23.7			25.5		

Table 2 Key factors associated with compliance to IPTp2 with SP in Enugu State

Variables	Exp(B)	Confidence interval for the odds ratio	
		Lower bound	Upper bound
Local Government Area	1.569	1.081	2.278
Wealth quintile	0.971	0.610	1.544
MIP knowledge	1.485	1.007	2.190
Constant	0.179		

Discussion

Studies on compliance with community disease control programmes have identified that certain sub-groups have lower compliance based on socio-demographic and Knowledge characteristics [25–29], and this study confirms the same problem with the prevention of MIP, thereby pinpointing subgroups of women who could benefit from more focused health education. The study revealed that knowledge of the causes, effects and prevention of malaria during pregnancy could influence compliance with utilization of the existing effective and cheap technologies for the prevention of malaria during pregnancy.

Although attendance in ANC did not seem to underscore any form of compliance in this study, it is important to note that all the respondents seemed to have attended ANC either in the public or private sector. This reflects the cosmopolitan nature of the study location. All the same it will bear reiteration to state that such knowledge on malaria should be packaged and delivered during ANC. Not only is ANC a place where first or additional doses of IPTp can be obtained, but as noted above, ANC offers an important opportunity for health education on the broader risks of MIP. It is useful to point out that formal education per se is not as important in compliance with IPTp as knowledge which can be acquired informally through

Table 3 Key factors associated with sleeping under ITN every night during last pregnancy

Variables	Exp(B)	Confidence interval for the odds ratio	
		Lower bound	Upper bound
Living with partner	3.510	1.023	12.044
Post secondary education	4.193	2.485	7.075
High wealth quintile	8.753	5.605	13.669
MIP knowledge	2.052	1.314	3.202
Constant	0.010		

neighbors and community volunteers. It was only in the case of ITN that formal education featured significantly to explain utilization. All the same knowledge is not the only variable of importance as seen with maternal age in control group. Living with a partner is also a factor, which may suggest that programmes to increase knowledge, should also target the partners of pregnant women as they have potential of reinforcing behavior and reminding the women to sleep under ITN.

Financial or economic factors may be common barriers to participation in utilization of health facilities. Even where the intervention is free, the poor women in resource poor countries first perceive the cost of the commodities before enlisting. Worse still, in Nigeria, the private sector, which is run for profit are more popular among the women. This may suggest why compliance is higher among the wealthier segments of the sample. However IPTp with SP is free, but fees were charged for ANC registration (US $2–3 depending on LGA). Similarly, ITN is free and the recommendation is to have at least two nets per household. The Nigeria Demographic and Health Survey (NDHS) however reported that the reality is a far cry from the prescription (NPC & ICF Macro [15]). Two nets per household is barley sufficient and to ensure full compliance the very educated ones purchase nets from the open market, which the poor women may not afford.

In conclusion, this study revealed that knowledge of malaria, locality, wealth status are associated with compliance with IPTp2 and sleeping under ITN every night during the last pregnancy. Further qualitative study could help confirm some of the challenges in terms of the social barriers associated with the different groups to design comprehensive health education strategies that would close the gaps identified.

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