



Malaria Preventive Practices among Pregnant Women in Akwa Ibom State, Southern Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author CAN wrote the protocol. Author TK wrote the first draft of the manuscript and managed the literature searches. Author NIP reviewed the first draft. Author OM performed the statistical analysis. The study is a part of the Niger Delta Development Company (NDDC) Professorial Chair on Malaria Elimination and Phytomedicine Research, University of Port Harcourt that collected the data. All authors read and approved the final manuscript.

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ABSTRACT

Background: Malaria is a serious public health problem in developing countries with Africa bearing most of its burden. Pregnant women are more susceptible to malaria and it is one of the leading causes of maternal and perinatal mortality/morbidity. Use of effective malaria preventive measures during pregnancy reduces its burden and complications.

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Aim: This was to determine malaria preventive practices used by pregnant women in Akwa Ibom state, Nigeria.

Materials and Methods: It was a cross sectional study of pregnant women attending public and private health facilities in Akwa Ibom state. An informed written consent was obtained from the participants. Stratified sampling method was used in selecting the health facilities and the study participants. Information was obtained with pretested questionnaires by trained personnel with the aid of Open Data Kit (ODK) on android phones. Data was managed with SPSS 22.0 and P-value of <0.05 was considered statistically significant.

Results: There were 935 participants in the study. Their mean age was 28.52 ± 5.09 years with 879 (94.0%) being married. Most had secondary and tertiary degrees: 451(48.2%) and 440(47.1%). Majority of them were traders/business women and self-employed (58.2%) while 7% were unemployed. Malaria preventive practices were use of window net, bed net and insecticides accounting for 659(71%), 447(48.2%) and 207(22.3%) respectively. There were 612 (65.5%) participants that received malaria drugs for prevention with 452(73.9%) receiving Intermittent Preventive Treatment in Pregnancy (IPTp) with Sulfadoxine-Pyrimethamine (SP). Only 296 (31.7%) of them slept under bed nets the night before the interview.

Conclusion: Common preventive practices employed by pregnant women were IPTp with SP, window nets, ITNs and modified IRS. Majority of the women utilized window nets, though not as effective as ITNs. Efforts should be intensified concerning awareness creation about the benefits of ITN use during pregnancy.

Keywords: Malaria; pregnant women; preventive practices.

1. INTRODUCTION

Malaria is a serious public health problem and remains an important cause of illness in adults and children. In 2017, there were 219 million cases of malaria and 435,000 deaths globally (WHO estimates). Sub-Saharan African region had 92% of these cases, South-East Asia region (5%) and the Eastern Mediterranean region (2%). Most of the malaria deaths (93%) occurred in the African region. Five countries accounted for almost half of the global malaria cases with Nigeria contributing 25% [1]. This makes malaria endemic in Nigeria, imposing a great burden on the economy and the already fragile health care systems. *Plasmodium falciparum* (*P. falciparum*) is the most dangerous of all the plasmodium species that cause malaria and the most prevalent in Africa. The most effective vector (*Anopheles gambiae* mosquito) is the most wide spread in Africa and the most difficult to control. Malaria in pregnancy is one of the leading causes of maternal and perinatal morbidity and mortality. The most important consequences are maternal anaemia and low birth weight babies with their attendant complications.

Effective ways of preventing malaria in pregnancy are to avoid mosquito bites and use of chemoprophylaxis. These preventive methods used during pregnancy contribute significantly in reducing adverse outcomes in pregnancies complicated by malaria. Practices geared

towards these will reduce the incidence of malaria.

The recently launched Sustainable Development goals also aim at eradicating malaria by 2030 with goal 3 being to ensure healthy lives and promote well-being for all at all ages. Target 3.3 of this goal is to end the epidemics of malaria and other diseases. The World Health Organization (WHO) recommends a Three-pronged approach to control malaria in pregnancy.

This includes; use of insecticide-treated nets (ITNs) especially the long lasting insecticidal nets (LLINs), intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), prompt and effective case management of malaria and anaemia [2-5]. In addition to this, intermittent screening and treatment of malaria in pregnancy (ISTp) where pregnant women are screened for malaria at each antenatal visit with a rapid diagnostic test and only those with identified infection are treated with antimalarial such as artemether-lumefantrine (ISTp-AL) is also used in some areas. Studies carried out in Ghana, Mali, Burkina Faso and the Gambia did not show any significant difference in maternal severe anaemia and low birth weight with IPTp and ISTp use [6,7]. A study in Nigeria however noted significantly lower risk in maternal parasitaemia and low birth weight in women with the practice of ISTp [8].

Other preventive measures are indoor residual spraying (IRS), use of window nets, door nets, insect repellants and protective clothing. Environmental sanitation, aerial spraying of insecticides, clearing of bushes and stagnant water to reduce mosquito breeding sites are also employed. Studies have shown that in highly endemic areas of Africa, insecticide treated nets have a mean protective efficacy of approximately 50% against malaria episodes [9]. In Kenya, ITNS have been found to be protective against malaria to pregnant women and their children in both areas of high and low malaria transmission [10]. Malaria prevention and control is still a difficult task in our environment despite deploying known interventions aimed at preventing the disease.

Prevention of malaria in pregnancy using the major tools of effective vector control (mosquito avoidance) and chemoprophylaxis depends on attitude and practices towards the use of these methods. Admittedly, there has been a paucity of studies in Nigeria in this area. However, studies carried out in Abuja and Uyo revealed good knowledge about malaria and its preventive measures among pregnant women but poor utilization of the measures [11,12]. In Port Harcourt, there were several misconceptions concerning the cause of malaria among antenatal attendees, although majority of them had good knowledge about the cause of the disease, their attitude towards prevention was however poor [13]. It was therefore pertinent to determine the present status of malaria preventive methods employed by pregnant women in Akwa-Ibom state, southern Nigeria.

2. METHODOLOGY

It was a cross sectional study of pregnant women attending private and public health facilities in Akwa Ibom state. A stratified method of sampling was used to select the health facilities and study participants. Two out of the list of health facilities offering Obstetric services were selected from each of the three senatorial districts and a total of six health facilities were selected. A hundred and fifty to 200 women were recruited from each facility depending on the size of the facility, giving a total of 935 pregnant women that participated in the study. Ethical approval was obtained from the Research and Ethics Committees of Universities of Uyo and Port Harcourt Teaching Hospitals and the state ministry of Health. The hospital administrations of the selected hospitals were notified and permission obtained from them

as regards the study. An informed written consent was obtained from the participants. Information about socio-demographic characteristics of participants, previous episode and treatment history of malaria in the previous one year and malaria preventive practices was obtained with pretested interviewer administered questionnaires by trained personnel with the aid of Open Data Kit (ODK) on android phones. Data was managed with SPSS 22.0 and results presented in prose and tables. P-value of <0.05 was considered statistically significant.

3. RESULTS

Nine hundred and thirty five pregnant women participated in the study. There were 879 (94.0%) married and 54 (5.8%) single women. Their mean age was 28.52 ± 5.09 years. Forty one (4.4%) of the participants had primary education, 451 (48.2%) had secondary education while 440 (47.1%) had tertiary education. Three (0.3%) of the participants had no formal education. Traders/business women made up 318 (34.0%) of the study population and 226 (24.2%) of the women were self-employed. Majority of the participants (57.8%) had a monthly family income of <30,000 Naira (<83 USD), only 76 (8.3%) of the women had a monthly income of \geq N90,000 (\geq 249 USD). The mean monthly family income was 34692.07 ± 47083.84 Naira (Table 1).

Table 2 shows that participants who received malaria medication for prevention constituted 612 (65.5%), with most of them receiving Fansidar (SP), 452 (73.9%). There were 336 (35.9%) participants that had not received any malaria treatment since their current pregnancy. Other preventive methods used include bed nets, window nets and insecticides constituting 447 (48.2%), 659 (71.0%) and 207 (22.3%) respectively. There were 296 (31.7%) participants that slept under bed nets the previous night, while 344 (53.8%) could not get a bed net.

A statistically significant association was established between receiving medication in pregnancy, frequency of malaria treatment, reason for not using bed net and malaria diagnosis ($p < 0.05$). The established association between malaria diagnosis and preventive method used was statistically insignificant ($p > 0.05$) as shown in Table 3.

4. DISCUSSION

Malaria is more prevalent in developing countries with Africa having more than 90% of its burden.

In Nigeria, malaria cases and deaths continue to rise despite implementation of recommended preventive measures used in tackling the disease by the national malaria control programme. This study showed that various methods of malaria prevention were employed by the participants. The common ones were use of drugs such as sulfadoxine-pyrimethamine (SP), known as fansidar (brand name), window nets, door nets, bed nets (ITNs), insecticides.

SP is the drug for intermittent preventive treatment of malaria in pregnancy (IPTp). Over 80% of the study participants that received medication reported to have received SP. This is

in contrast with other studies in Nigeria where 5.3% and 31.8% reported the use of SP respectively [14,15]. Low proportion of SP use in these studies could be as a result of poor knowledge and attitude exhibited by participants towards the use of this drug as a preventive measure and the problem of affordability, as the drugs were not given free. Increase proportion of SP usage in pregnancy reported in this study may have resulted from increased awareness of SP usage created from an earlier study [12] in the same locale. IPTp has been found in some studies to be protective against maternal anaemia, placental parasitaemia and low birth weight [16,17].

Table 1. Socio-demographic features of participants

Variable	Frequency (n)	Per cent (%)
Age (in years)		
≤ 25	256	27.4
26 – 30	373	39.9
31 – 35	226	24.2
>35	80	8.6
Mean Age	28.52±5.09 years	
Marital Status		
Single	54	5.8
Married	879	94.0
Divorced	1	0.1
Widowed	1	0.1
Education Level		
None	3	0.3
Primary	41	4.4
Secondary	451	48.2
Tertiary	440	47.1
Occupation of Participants		
Trader/business woman	318	34.0
Self-employed	226	24.2
Teacher	109	11.7
Civil servant	85	9.1
Public servant	69	7.4
Unemployed	65	7.0
Student	27	2.9
Artisan	19	2.0
Farmer	12	1.3
Professional/private employed	5	0.5
Family's average monthly income (in Naira)		
< 30000	532	57.8
30000 – 59999	234	25.4
60000 – 89999	78	8.5
≥ 90000	76	8.3
Mean family income	34692.07±47083.84	

Table 2. Prevention of malaria

Variable	Frequency (n)	Per cent (%)
Received Medication for malaria in pregnancy		
No	323	34.5
Yes	612	65.5
Medication received (Multiple response, n = 644)		
Fansidar (SP)	452	73.9
ACT	116	19.0
SP	58	9.5
Others	13	2.1
Herbs	5	0.8
Frequency of malaria treatment in present pregnancy		
None	336	35.9
Once	391	41.8
Twice	170	18.2
Thrice	34	3.7
Four times or more	4	0.4
Mean Number of treatments	0.91±0.85 times	
Preventive method used (Multiple response n = 1343)		
Bed net (ITN)	447	48.2
Window net	659	71.0
Insecticides	207	22.3
Door net	21	2.3
Others	9	1.0
Used a bed net in the past night		
No	639	68.3
Yes	296	31.7
Reason for not using bed net (multiple response, n = 652)		
Uncomfortable	298	46.6
Ineffective	10	1.6
Can't get one	344	53.8

Insecticide treated bed nets were utilized by 48.8% of the women as a means of preventing malaria in this study. ITNs especially long lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) are the most common vector control interventions in reducing malaria transmission. Use of ITNs requires that the nets should be used every night and all year round even when mosquitoes seem to be absent. When used consistently and correctly, they reduce the incidence of malaria in pregnancy with its attendant complications. The use of ITNs in this study was low compared to a Kenyan study where as high as 70.5% of the women used ITNs [18], but higher than a similar study conducted in the same state where only 16.4% pregnant women used ITNs for malaria prevention [12]. The increase in utilization could be due to increase awareness creation in the community about the benefits of ITN use during pregnancy in an earlier study [12]. Another study done in a neighbouring state – Rivers state also reported low use of ITNs (15.75%), with only 1% of the pregnant women having reported to have

slept under bed nets the night before the interview [13]. In this study, 31.7% of the participants used a bed net the previous night. The ITN use rate found in this study is however similar to other studies carried out in Nigeria where ITN usage was low even when the women actually owned the nets [19,20]. This is quite worrisome and calls for more awareness creation to the women, their husbands and communities about the benefits of ITN use by pregnant women. Various reasons were given by the women for not using the bed nets in this study which include discomfort resulting from heat, perceived ineffectiveness of the nets and lack of access to bed nets. This is consistent with what was reported in other studies [20,21]. Lack of constant electricity supply in most parts of country makes it difficult in tackling the problem of discomfort associated with use of nets due to heat. Regular mass free distribution of nets will increase access to the nets but increasing net utilization will require an increased political will to ensure regular electricity availability to cushion the heat involved with its use. A biomodification

of the nets by its producers to reduce the heat associated with its use will also be motivating. Other reasons such as difficulty in hanging the nets, its smell, negative perception that the chemicals used in treating the nets are associated with poor pregnancy outcomes and adverse effects on children had been documented by other researchers [19-21].

Other preventive measures used were window nets, door nets and insecticides. Window nets and door nets are not as effective in prevention of malaria as ITNs. Production of window nets in this part of the world is not standardized as different products have different fenestration sizes, and in homes where they are used, they are not regularly maintained with some being torn. The effectiveness of these nets therefore cannot be guaranteed but surprisingly, 71% of the participants used window nets in this study. Indoor residual spraying (IRS) is an effective way of controlling the vector (mosquito) which

transmits malaria parasites through its bite. IRS rapidly reduces adult mosquito density and longevity thereby interrupting malaria transmission. This involves spraying the inside of houses (walls and ceilings) with effective insecticide which kills the mosquitoes when they come in contact with it since malaria vectors tend to rest indoors. This however requires skilled manpower and it is capital intensive. Combined use of IRS with ITNs has further been shown to be beneficial in areas of moderate to high malaria transmission and where utilisation of nets is low [22]. Indoor spraying of insecticides was utilised by 22.3% of the participants. This is a modified form of indoor residual spraying where insecticides are used to spray the inside of houses and the rooms left closed for a period of time in order to kill mosquitoes. This is usually done shortly before bed time. These insecticides can kill mosquitoes and other insects but the effect is usually short lived and requires regular use.

Table 3. Relationship between malaria diagnosis and treatment/prevention of malaria

Variable	Malaria diagnosis		Test of significance	
	No, n(%)	Yes, n(%)	X ²	p-value
Received Medication for malaria in pregnancy				
No	218 (37.8)	105 (29.3)	6.980	0.008
Yes	359 (62.2)	253 (70.7)		
Medication received (Multiple response, n = 644)				
ACT	70 (18.5)	46 (17.3)	Fishers'	0.413
Fansidar	299 (71.7)	181 (68.0)		
Supplements	3 (0.8)	2 (0.8)		
SP	28 (7.4)	30 (11.3)		
Others	6 (1.6)	7 (2.6)		
Frequency of malaria treatment in present pregnancy				
None	312 (54.1)	24 (6.7)	221.934	<0.001
Once	166 (28.8)	225 (62.8)		
Twice	75 (13.0)	95 (26.5)		
Thrice	22 (3.8)	12 (3.4)		
Four times or more	2 (0.3)	2 (0.6)		
Preventive method used (Multiple response n = 1343)				
Bed net (ITN)	273 (32.9)	174 (34.0)	Fisher's	0.242
Window net	397 (47.8)	262 (51.2)		
Insecticides	138 (16.6)	69 (13.5)		
Door net	16 (1.9)	5 (1.0)		
Others	7 (0.8)	2 (0.4)		
Used a bed net in the past night				
No	397 (68.8)	242 (67.6)	0.149	0.700
Yes	180 (31.2)	116 (32.4)		
Reason for not using bed net (multiple response, n = 652)				
Uncomfortable	173 (42.2)	125 (51.7)	Fishers'	0.011
Ineffective	4 (1.0)	6 (2.5)		
Can't get one	233 (56.8)	111 (45.9)		

5. CONCLUSION

Common preventive practices employed by pregnant women were IPTp with SP, window nets, ITNs and modified IRS. Window nets, though not as effective as ITNs were utilized by majority of the women. Efforts should be intensified concerning creation of awareness about the benefits of ITN use during pregnancy.

6. RECOMMENDATION

There is need to intensify awareness creation about the use and benefits of ITNs. The nets should be made available to pregnant women at no cost and there should be increase political will to tackle the problem of lack of regular electricity supply which makes ITN usage uncomfortable due to heat. A combination of ITNs and IRS which are powerful tools in vector control coupled with IPTp will significantly reduce the incidence of malaria in pregnancy.

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CONSENT

Informed written consent was obtained from the participants.

ETHICAL APPROVAL

This was obtained from the Research and Ethics Committees of Universities of Uyo and Port Harcourt Teaching Hospitals and the state ministry of Health.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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