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Research Article

Malaria Preventive Practices among Pregnant Women in the Niger Delta Region of Nigeria: A Comparative Study

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Abstract

Background: Malaria has a deleterious effect on pregnancy leading to serious pregnancy complications and adverse pregnancy outcomes. Use of effective malaria preventive practices during pregnancy mitigates the harmful effect of the disease on pregnancy.

Aim: To determine the malaria preventive practices used by pregnant women in three states (Rivers, Delta, Akwa Ibom) of the Niger Delta region of Nigeria.

Materials and Methods: A cross-sectional study was carried out in public health facilities in three states of the Niger Delta, Nigeria to assess the preventive practices of pregnant women over a six month period. A total of six health facilities was selected from each state giving eighteen health facilities from the three states. Approximately 100 to 200 consenting pregnant women were recruited over a period of one to two weeks from each facility. Information was obtained with pretested questionnaires by trained personnel with the aid of Open Data Kit (ODK) on android phones. The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 22 and results were presented in prose and frequency tables. A p-value of <0.05 was considered statistically significant.

Results: There were 2,960 participants (mean age 29.6 ± 4.93) with 2844 (96.08%) being married. Over half 53.01% (1569) had tertiary education, majority 35.37% (1047) of them were traders and business women. Preventive practices employed included window nets use 42.3% (2059), insecticides 28.9% (1411), bed nets 27.9% (1360), and others. There were 59.14% (1100) that received medications for prevention out of which 79.83% (918) received IPTp-SP. Only 33.6% (993) slept under the net the night before the interview.

Conclusion: In the Niger Delta region, uptake of IPTp is above 70% and provided a significant prophylactic benefit compared to those that did not take. However ITN use was very low in the area whereas IRS was not in use at all. The need for continuous enlightenment and awareness of the importance of these practices especially ITN use in the study area is very imperative.

Keywords: Pregnant Women; Preventive Practices; Malaria; Niger Delta

1. Introduction

Malaria is a life-threatening disease caused by malaria parasites that are transmitted to humans through the bites of infected female Anopheles mosquitoes [1]. An estimated 30 million women living in malaria endemic areas of Africa become pregnant each year [2]. Nigeria is among the 45 countries that are endemic for malaria with a significant 97% of the population being at risk especially children and pregnant women [3]. Pregnant women are particularly vulnerable to malaria because pregnancy reduces immunity and increases susceptibility to malaria infection. Pregnant women are three times more predisposed to malarial infection compared with their non-pregnant counterparts, and have a mortality rate that approaches 50% [4]. Malaria in pregnancy is associated with adverse pregnancy outcomes in the mother, her foetus and the newborn [5]. The complications of malaria in pregnancy include: maternal severe anaemia, acute pulmonary oedema, renal failure, puerperal sepsis, postpartum haemorrhage and increased risk of death. Others are spontaneous abortion, low birth weight, neonatal death, poor development, behavioural problems, short stature, and neurological deficits [6]. The magnitude of economic burdens arising from malaria in many African countries, though often underestimated due to poorly developed health management information systems [7], makes it a ruthless public health problem with significant devastating potentials [8, 9]. Malaria still constitutes

heavy socioeconomic and public health burden on pregnant women in the Niger Delta [10]. Malaria is a preventable disease, yet a major cause of maternal and newborn illness and death in Africa, resulting in about 10,000 maternal deaths and between 75,000 and 200,000 infant deaths each year with most of these deaths occurring in sub-Saharan Africa especially Nigeria [11]. The use of preventive practices against malaria among women of reproductive age is a key factor for the actualization of the malaria control targets in Nigeria.[12] The malaria preventive practices have been observed to be generally sub-optimal in all the six geo-political regions of the country [12-16]. The non-use of preventive measures has severe morbidity and mortality implications, especially for pregnant women and under-five children [17, 18]. It also has adverse socio-economic effects on the individual, community and national economy [12]. For instance, it is estimated that Nigeria loses about 132 billion naira annually from the cost of malaria treatment, transportation to sources of treatment, absenteeism from school, farming, sporting activities, work, etc. [19, 20]. The National Malaria Control Program noted in its 2006 report that the non-use of preventive measures was one of the major challenges of the Roll Back Malaria program in Nigeria [13].

In a study in Ibadan, South-West Nigeria [15], it was found that a considerable proportion of both the pregnant women (60.4%) and the non-pregnant mothers of children aged under 5 years (45.8%) did not have correct knowledge on malaria preventive measures. The study showed that marital status, educational attainment, gravidity, and HIV status were significantly associated with knowledge of malaria prevention and control [15]. A study done in Port Harcourt South South Nigeria [12] showed that the use of malaria prevention measures among women of reproductive age is still sub-optimal. Of the 49.3% that owned insecticide treated bed nets (ITNs), only 18.2% used them consistently, while only 50% of the pregnant women received intermittent preventive treatment (IPTp) [12]. Similarly, a study in Osogbo, Nigeria [16] revealed that the practice of malaria prevention was generally low among the respondents. In this study, only 34.4% used the insecticide treated nets (ITNs) and 21.4% used intermittent preventive therapy (IPTp), while 12.8% practiced clearing of surrounding bushes, and 15.4% practiced maintenance of drainages and netting of windows and doors [16]. Therefore, considering the burden of malaria among our obstetric population, there is an obvious need to investigate the factors that influence the application of malaria preventive practices in our setting. The findings from this study, will add to the existing body of knowledge and will be beneficial in specifying strategies for malaria interventions in the region.

2. Methodology

This was a cross sectional study carried out on 2,960 pregnant women attending antenatal clinic in public and private health facilities in Rivers, Delta and Akwa Ibom States over a six-month period (1st January to 30th June 2019). A stratified sampling method was used and each of the three states was stratified into three senatorial districts via equal allocation giving a total of nine senatorial districts. The sampling frame consisted of health facilities offering obstetric services. Two health facilities were selected from the sampling frame from each senatorial district. This was done by simple random sampling using computer generated table of random numbers. A total of six health facilities was selected from each state giving eighteen health facilities from the three states. Approximately 100 to 200 consenting pregnant women were recruited over a period of one to two weeks from each facility depending on their size. Information was obtained with pretested questionnaires by trained personnel with the aid of Open

Data Kit (ODK) on android phones. The data was analysed using Statistical Package for the Social Sciences (SPSS) version 22 and results were presented in prose and frequency tables. A p-value of <0.05 was considered statistically significant.

2.1 Ethical approval

Ethical clearance was obtained from the Research and Ethics committees of the University of Port Harcourt Teaching Hospital (UPTH), the Rivers State Ministry of Health; the University of Uyo Teaching Hospital, Uyo and the Akwa Ibom State Ministry of Health. The hospital administration of the selected hospitals from all the states were notified and permission to carry the study was obtained from them.

3. Results

Out of a total of 2,960 respondents that participated in the study, demographic data obtained showed a range of < 25 to > 35 years (29.6 ± 4.93years). Out of these 2,960 respondents, 2844 (96.1%) were married while 108 (3.65%) were single. The data showed that 1,569 (53.01%) of the women had tertiary education, 1,291 (43.6%) had secondary education, 92 (3.1%) had primary education while only 7 (0.24%) had no formal education (Table 1). The participants' occupation ranged from traders/business women, civil and public servants to self-employed and unemployed with a greater percentage (1047/35.37%) of the women being traders/business women (Table 1). Results show practices employed in the various states for prevention of malaria to be either medication use (Table 2) or other preventive measures which include sleeping under insecticide treated bed nets (ITN), use of insecticides and mosquito repellents, use of door nets and window nets and bush clearing (Table 3). The use of window nets as a method of malaria prevention was found to be the highest in all the states with an average of 42.9% followed by use of insecticides (28.9%), bed nets accounting for 27.9% and lastly door nets (Table 3). Window nets and bed nets use were found highest in Akwa Ibom state accounting for 49.1% and 33.3% respectively, while insecticides use was highest in Rivers State followed by Delta state and least in Akwa Ibom. On the other hand, the least preventive measure in all the states was the use of door nets. This difference in preventive measures techniques practiced in the different states was statistically significant with p=0.0001. Other methods used include bush clearing, environmental sanitation and use of mosquito repellents.

Variable	Rivers State No (%)	Delta State No (%)	Akwa Ibom State No (%)	Total No (%)	Chi Square/P-value
Age (in years)					
≤ 25	164 (16, 3)	215 (21.1)	256 (27.4)	635 (21.45)	78.43 (0.0001)*
26 – 30	337 (33.4)	355 (34.9)	373 (39.9)	1065 (35.97)	
31 – 35	351 (34.8)	284 (27.9)	226 (24.4)	861 (29.08)	
>35	156 (15.5)	163 (16.1)	80 (8.6)	399 (13.47)	
Mean Age (years)	30.56 ± 4.93	29.98 ± 5.41	28.52 ± 5.09		0.455[A]
Marital Status					
Single	17 (1.7)	37 (3.6)	54 (5.8)	108 (3.65)	23.35 (0.0007)*
Married	988 (98.0)	977 (96.1)	879 (94.0)	2844 (96.08)	
Divorced	2 (0.2)	2 (0.2)	1 (0.1)	5 (0.17)	

Widowed	1 (0.1)	1 (0.1)	1 (0.1)	3 (0.10)	
Education Level					
None	1 (0.1)	4 (0.4)	3 (0.3)	8 (0.27)	111.8 (0.0001)*
Primary	3 (0.3)	48 (4.7)	41 (4.4)	92 (3.11)	
Secondary	348 (34.5)	492 (48.4)	451 (48.2)	1291 (43.61)	
Tertiary	656 (65.1)	473 (46.5)	440 (47.1)	1569 (53.01)	
Occupation of Participants					
Trader/business woman	287 (28.5)	442 (43.5)	318 (34.0)	1047 (35.37)	123.3 (0.0001)*
Self-employed	185 (18.4)	189 (18.6)	226 (24.2)	600 (20.27)	
Teacher	134 (13.3)	114 (11.2)	109 (11.7)	357 (12.06)	
Unemployed	118 (11.7)	89 (8.8)	85 (9.1)	292 (9.86)	
Civil servant	92 (9.1)	54 (5.3)	69 (7.4)	215 (7.26)	
Public servant	90 (8.9)	53 (5.2)	65 (7.0)	208 (7.03)	
Student	43 (4.3)	33 (3.2)	27 (2.9)	103 (3.48)	
Artisan	20 (2.0)	32 (3.1)	19 (2.0)	71 (2.40)	
Others	19 (1.9)	0 (0.0)	0 (0.0)	19 (0.64)	
Professional/privately employed	12 (1.2)	2 (0.2)	5 (0.5)	19 (0.64)	
Farmer	8 (0.8	9 (0, 9)	12 (1.3)	29 (0.98)	

*statistically significant ($p < 0.05$) [A]ANOVA (Analysis of variance to compare means)

Table 1: Socio-demographic features of participants.

Variable	**Rivers State No (%)**	**Delta State No (%)**	**Akwa Ibom State No (%)**	**Total No (%)**	**Chi Square/ p-value**
Received Medication for malaria in pregnancy					
No	364 (36.1)	441 (43.4)	323 (34.5)	1128 (38.11)	18.64 (0.0001)*
Yes	644 (63.9)	576 (56.6)	612 (65.5)	1832 (61.89)	
Medication received (multiple response)	**Multiple response (n = 694)**	**Multiple response (n = 589)**	**Multiple resp-onse (n=644)**		
ACT	72 (10.4)	44 (7.5)	116 (18.0)	232 (12.04)	148.1 (0.0001)*
Sulphadoxine-Pyrimethamine (SP)	548 (79.0)	503 (85.4)	452 (70.2)	1503 (78.00)	
Herbs	3 (0.4)	2 (0.3)	5 (0.8)	10 (0.52)	
Supplements	29 (4.2)	8 (1.4)	58 (9.0)	95 (4.93)	
Proguanil	31 (4.5)	1 (0.2)	0 (0.0)	32 (1.66)	
Others	11 (1.6)	31 (5.2)	13 (2.0)	55 (2.85)	

Frequency of malaria treatment in present pregnancy					
None	456 (45.2)	604 (59.4)	336 (35.9)	1396 (47.16)	159.8 (0.0001)*
Once	298 (29.6)	260 (25.6)	391 (41.8)	949 (32.06)	
Twice	163 (16.2)	89 (8.8)	170 (18.2)	422 (14.26)	
Thrice	75 (7.4)	43 (4.2)	34 (3.7)	152 (5.14)	
Four times or more	16 (1.6)	21 (2.1)	4 (0.4)	41 (1.39)	

*Distribution is statistically significant ($p < 0.05$)

Table 2: Prevention of Malaria using medication.

Variable	**Rivers State No (%)**	**Delta State No (%)**	**Akwa Ibom State No (%)**	**Total No (%)**	**Chi Square/ p-value**
Preventive method used (multiple response, n = 1812)	**Multiple response (n=1812)**	**Multiple response (n=1717)**	**Multiple response (n=1343)**		
Bed net (ITN)	429 (23.7)	484 (28.2)	447 (33.3)	1,360 (27.9)	218.1 (0.0001)*
Window net	720 (39.7)	680 (39.6)	659 (49.1)	2,059 (42.3)	
Insecticides	655 (36.2)	549 (32.0)	207 (15.4)	1,411 (28.9)	
Door net	4 (0.2)	0 (0.0)	21 (1.6)	25 (0.5)	
Others	4 (0.2)	4 (0.2)	9 (0.7)	17 (0.4)	
Used a bed net in the past night					
No	695 (68.9)	633 (62.2)	639 (68.3)	1967 (66.4)	12.40 (0.002)*
Yes	313 (31.1)	384 (37.8)	296 (31.7)	993 (33.6)	
Reason for not using bed net (multiple response)	**Multiple response (n=722)**	**Multiple response (n=646)**	**Multiple response (n=652)**		
Uncomfortable	275 (38.1)	247 (38.2)	298 (45.7)	820 (40.6)	34.05 (0.0001)*
Ineffective	49 (6.8)	20 (3.1)	10 (1.5)	79 (3.9)	
Can't get one	398 (55.1)	379 (58.7)	344 (52.8)	1121 (55.5)	

Others: Bush clearing, Environmental sanitation, Repellents

*Distribution is statistically significant ($p < 0.05$)

Table 3: Preventive practices.

Variables	**Malaria Positive, n=1100, (%)**	**Malaria negative, n=1860, (%)**	**Chi-square (p-value)**
Received Medication for malaria in pregnancy			
No	368 (33.45)	760 (40.86)	16.07 (0.0001)*

Yes	732 (66.55)	1100 (59.14)	
Medication received (Multiple responses apply)			
ACT	99 (12.82)	133 (11.57)	
Sulphadoxine-Pyrimethamine (SP)	585 (75.78)	918 (79.83)	
Herbs	0 (0)	5 (0.43)	16.03 (0.0068)*
Supplements	54 (6.99)	41 (3.57)	
Proguanil	17 (2.2)	28 (2.43)	
Others	17 (2.2)	25 (2.17)	
Total	**1150**	**772**	
Preventive method used (Multiple response apply)			
Bednet (ITN)	512 (28.05)	848 (27.83)	
Window net	801 (43.89)	1258 (41.29)	
Insecticides	501 (27.45)	910 (29.87)	6.51 (0.1642)
Door net	7 (0.38)	18 (0.59)	
Others	4 (0.22)	13 (0.43)	
Total	**3047**	**1825**	
Used a bed net in the past night			
No	721 (65.55)	1246 (66.99)	0.64 (0.4214)
Yes	379 (34.45)	614 (33.01)	
Reason for not using bed net (multiple response apply)			
Uncomfortable	305 (41.61)	515 (40.02)	
Ineffective	27 (3.68)	52 (4.04)	0.57 (0.7507)
Can't get one	401 (54.71)	720 (55.94)	
Total	**1287**	**733**	

*Distribution is statistically significant ($p < 0.05$)

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Table 4: Relationship of Malaria preventive practices and malaria diagnoses in the three states.

The distribution of women that used bednets (ITN) and had malaria was not significantly different from women who used ITN and were negative for malaria. Hence, it shows that the reported use of ITN among the women did not necessarily prevent the occurrence of malaria (Table 4). Analyzing the results of the prevention with the use of medications, all the states used Sulphadoxine-pyrimethamine (SP) at an average of 78% for IPTp with Delta States having the highest use at 85.4% while Rivers and Akwa-Ibom states had 79% and 70.2% respectively. The proportion of women who received SP and were negative for malaria (79.83%) were significantly higher than those that were positive (75.78%). This indicates that prophylaxis with SP was significant in the prevention of malaria (p=0.0068). Fewer women used ACT across the three states with highest use in Akwa-Ibom (18%), followed by Rivers (10.4%) ad lowest in Delta (7.5%). Other medications used were proguanil, supplements and herbs. These differences in proportions of women who used SP and other forms of medication is statistically significant (p=0.0001).

4. Discussion

Malaria control is multifaceted and consists of vector control, chemotherapy or the treatment of malaria with drugs, chemoprophylaxis and other preventive measures that help in the reduction of transmission of malaria. In sub-Saharan Africa, the primary interventions for preventing malaria are the ITNs and the Long-lasting Insecticidal nets LLINs [21]. In the present study, similar methods of prevention were employed by the participants in the different states but in varying proportions. However, the use of window nets was found to be the most common preventive method in all the states. Use of ITN was very poor in all the states ranging from 23.7% in Rivers to 33.3% in Akwa Ibom with an average of 27.9%. The average rate obtained is similar to 28.9% obtained in South-South part of Ethiopia [22]. ITN use has been proven to be a very effective method of vector control with reports of 90% reduction in malaria transmission when used consistently and properly [23, 24]. Many reasons were given by the women for not using bednets with over 50% of reason being that they could not get one. Observation from the present study shows that the reported use of ITN among the women did not necessarily prevent the occurrence of malaria. Many reasons could be responsible for this outcome, such as improper use of the nets, nets may be torn or have holes and sometimes forgetting to sleep under the nets as reported in the Ethiopian study [22]. Despite the insignificance difference in use of bednets in malaria positivity between those that used and those that did not use, efforts should be made by the government and other stakeholders to ensure availability of ITNs to the populace.

The study established a high rate (76.5%) of window net use with Rivers State having the highest use. Window nets are regular features of many houses in Nigeria used not only to prevent mosquitoes but also to ward off other insects and creeping things into the houses. Its use have not been proved as very effective since mosquitoes still have access to the homes despite their presence [25]. Furthermore, the quality of these nets cannot be guaranteed since there are different types of the nets and there is no standardized feature established in the country. Additionally, in many homes, the nets are torn or worn out so they cannot be relied upon as a good source of mosquito control.

Insecticide use which is a modified form of indoor residual spraying is very common in Nigeria since many of the insecticides are affordable and available from supermarkets. In many homes in Nigeria, it is commonly used not just for killing mosquitoes for prevention of malaria but are also very useful for eliminating other insects in houses and even offices.

Use of intermittent preventive treatment (IPTp), a very important measure as recommended by WHO was found to be high in all the states at an average of 78%. This is much lower than 92% obtained among women attending antenatal clinic in a Cameroonian study [26]. Comparing IPTp use in the three states, Delta State had the highest use (85.4%) and Akwa Ibom least with 70.2%. The results obtained in Akwa Ibom is in consonance with past studies of a range of 74% to 78% obtained in Ebonyi State Eastern Nigeria and Ado-Ekiti, Western Nigeria [27, 28]. IPTp use has been found to cause increase in mean birth weight of babies, reduce the number of low birth weights, reduced placental and maternal parasitaemia. These beneficial effects are more obvious in women in their first and second pregnancies and especially with the intake of three or more doses [29]. The World Health Organization recommends that use of IPTp should be administered as directly observed therapy (DOT) to ensure compliance by the women [30].

5. Conclusion

The study has shown the IPTp-SP use in the three states to be above 70%. Preventive practices used in the area include window nets, insecticide use, bednets etc. Our findings reveal the use of Insecticide-treated bednets which have long been established as a very good measure of vector control to be very low in the Niger Delta area. The need for continuous enlightenment and awareness of the importance of these practices especially ITN use in the study area is very imperative.

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