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MALARIA PREVALENCE AND DRUG MANAGEMENT IN PREGNANT WOMEN ATTENDING REMOTELY LOCATED DAURA GENERAL HOSPITAL, NORTH WEST NIGERIA

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ABSTRACT: *Health authorities in Nigeria have for many years promoted national malaria control measures such as the use of insecticide treated bed nets (ITNs), indoor residual spray of insecticides (IRS), intermittent preventive treatment (IPTp) for pregnant women and children and the use of artemisinin combined therapy (ACT) as first line of treatment to reduce the prevalence of the disease in the country. In order to evaluate the effectiveness of these control measures, there is the need for continued disease monitoring and management across different zones of the country, especially among high risk cohorts such as children and pregnant women at remote locations. A 13 months study (July 2014 to July 2015) was carried out to establish the current prevalence of malaria among female patients attending Daura General Hospital in North West Nigeria, using standard laboratory procedures. Daura is a remotely located town that lies in the semi-arid zone of northern Nigeria at the intersection of roads from Katsina, Kano and Zinder in Niger Republic, with coordinates of 13^0 2'11'' North, 8^0 19'4'' East and 1,558 feet (474 meters) above sea level. Of the 8413 patients that tested positive for malaria parasite during the period, 1119 (13.30%) were children, 3721 (44.23%) were women, 2609 (30.99%) were men and 966 (11.48%) were the elderly. Among the infected women population, 2105 (56.57%) were pregnant (PGW), while 1616 (43.23%) were non-pregnant (NPW) women, indicating statistical significance in malaria prevalence between the two cohorts ($p<0.05$). Age related prevalence was significantly higher ($p<0.05$) in the 11 – 20 years group (32.68%) of the PGW and 21 - 30 years group (44.43%) of the NPW than the 25.89% recorded in the 21 – 30 years group and 21.05 and 20.38% recorded in the 31 – 40 years and 41 – 50 years groups of the PGW respectively. The highest seasonal prevalence rate was recorded during the late rainy season (LRS) months of July to September (10.86% for PGW and 8.83% for NPW) followed by the 7.73% recorded for PGW and 7.24% recorded for NPW during the early dry season (EDS) months of October to December. The lowest rates (5.67 and 5.46% for PGW and 6.50% for NPW) were recorded during the early rainy (ERS, April - June) and late dry season (LDS, January – March) months respectively. Monthly prevalence rates were highest during August (15.63%), September (15.11%) and October (11.26%) for the PGW, while corresponding prevalence figures for these months among the NPW were significantly lower ($p<0.05$) at 8.29, 9.22 and 7.80% respectively. Major drugs prescribed for the prevention of malaria during the second and third trimesters once foetal quickening is noticed include sulphadoxine/pyrimethamine given monthly, while for cure and treatment during all trimesters quinine SO_4, arthessunate, α-β arteate and arthessunate/lumefantrim were prescribed. Analgesics, electrolytes and vitamins were also indicated. Malaria is a major cause of hospital visits pregnant women especially during the rainy season months, indicating the need to improve advocacy on intervention control measures among these groups in the study area.*

KEYWORDS: Malaria, pregnant women, drug management, hospital, Nigeria
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INTRODUCTION

Annually, more than 25 million women become pregnant in sub-Saharan Africa while exposed to malaria and its associated burdens, which may include maternal anemia, low birth weight (LBW), miscarriages, intra-uterine growth retardation, prematurity and still births among others (Steketee *et al*., 2001; Greenwood *et al*., 2007). In Nigeria, data from several reports (Adefioye *et al*., 2007; Aribodor *et al*., 2007; Chukwuocha *et al*., 2012) show that malaria is associated with 11.00% of all maternal deaths and 70.50% of morbidity in pregnancy. It also accounts for more than 15.00% of maternal anemia, 5.00 – 14.00% of LBW and 30.00% of preventable LBW. More so, the reports of Lindsay *et al*. (2000) state that pregnant women are more attractive to mosquitos, this makes the parasite density higher in them.

These make malaria infection during pregnancy a major public health problem in endemic regions (WHO, 2011) with its symptoms and complications varying with intensity of parasite transmission and immunity levels in the pregnant woman (Chukwuocha *et al*., 2011). The pathophysiological changes that occur when pregnancy and malaria occur together tend to be synergistic, thus, making both the maternal and fetal lives more vulnerable (Steketee *et al*., 2001).

Health authorities in Nigeria have for many years promoted national malaria control measures such as the use of insecticides treated nets (ITNs), indoor residual spray of insecticides (IRS), intermittent preventive treatment (IPTp) for pregnant women and children and the use of artemisinin combined therapy (ACT) as first line of treatment to reduce the prevalence of the disease in the country (MIS, 2010). In order to evaluate the effectiveness of these control measures, there is the need for continued disease monitoring and management across different zones of the country, especially among high risk cohorts such as children and pregnant women at remote locations. There is also the need to compare current efforts at controlling and managing malaria during pregnancy.
This paper therefore discusses malaria prevalence and drug management in pregnant woman attending the remotely Daura General Hospital in the northwest zone of Nigeria.

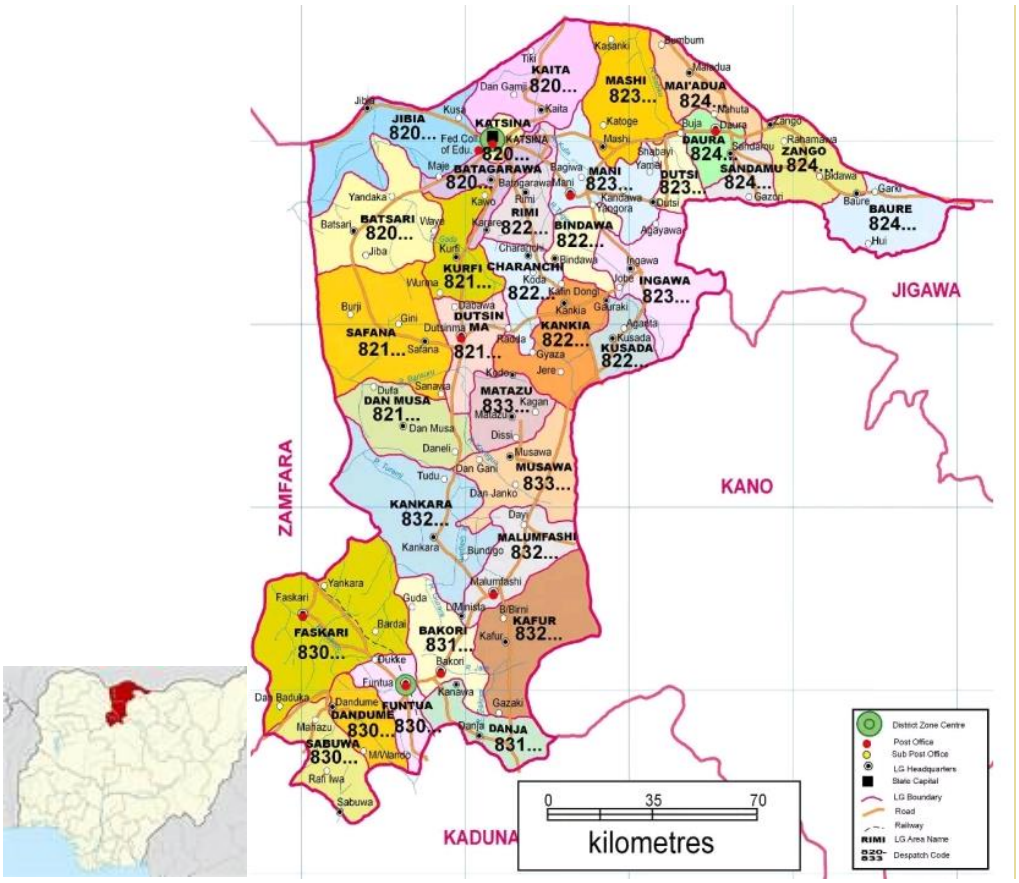
MATERIALS AND METHODS

Study area

The study was carried out in Daura General Hospital, Daura in Katsina State, northwest zone of Nigeria. Daura is a city, emirate and capital of Daura Local Government Area (LGA) in Katsina State. Daura L. G. A, lies between latitude $13^0 21'$ North and longitude $8^0 19'$ East, with an elevation of 1558ft (474m) above sea level (Figure I). The town lies in the semi-arid zone at the intersection of roads from Katsina town, Kazaure, Kano and Zangoin Nigeria and Zinder in Niger Republic. The climate of Daura is characterized by two well-marked seasons, the rainy season, extending from May to September and the dry season, from October to May. The dry season is characterized by harmattan dust between November and February. During this period, the northeast harmattan laden dust lowers the day time temperature to about 25^0C and about 21^0C in the night. During the rainy season, the prevailing wind blows in a south – westerly direction and causes humidity to rise considerably. During this period, the mean daily temperature is usually between 28- 30^0C, while the maximum amount of rainfall occurs between August and September.

The soils are easily worked and well suited to crops such as millet and groundnut, which are less demanding in their requirement than cotton and feathery grass cover. This zone is semi-arid and

the few river systems dry up during the dry season. There are dams at Ajiwa town and other dams at Jibia and Zabge near Daura which are used for irrigation and fishing. There are also small artificial dams erected for farming purposes in most of the towns in the zone. These artificial water bodies serve as excellent breeding grounds for mosquitos.
Daura General Hospital is the major healthcare establishment catering for the health needs of the LGA and beyond. However, there are private hospitals and smaller government health centers located in adjoining towns in the LGA.



Map of Katsina State showing Daura L.G.A Nigeria

Data collection
The study was carried out over a period of 13 months from July 2014 to July 2015. The study population was male and female patients with focus on pregnant females attending Daura General Hospital during the period. Data were generated from blood samples analyses of patients referred to the hospital parasitology laboratory unit.

Three malaria diagnostics methods were routinely used in the hospital and included the rapid field stain (RFS) for thin film, field stain method (FSM) for thick blood films and strip test (ST) with malaria kit of three direct rapid test (DRT) based on antigen antibody reactions. The procedures have been described by Mohammed (2000) and Warrell and Gilles (2002). Data on drug management of malaria cases were obtained from the medical records of the clinically diagnosed patients in the hospital during the study period. The data were thereafter abstracted from the records on standardized forms created for the purpose of the study and subsequently analyzed.

Data analysis

Data generated on malaria prevalence were subjected to statistical analysis across sex, age, months and pregnancy status using chi-square test. Trends in malaria infection in pregnant women over the 13 months periods were presented in graphs, while seasonal trends were calculated across four seasons namely: late rainy season (LRS, July - September), Early dry season (EDS, October - December), Late dry season (LDS, January - March) and early rainy season (ERS, April – June).

RESULTS AND DISCUSSION

Table 1 shows the overall prevalence of malaria across different population cohorts attending Daura General Hospital from July 2014 to July 2015. Women constituted the highest population group (44.23%) followed by men (30.99%), while values for children and the elderly were much lower at 13.30 and 11.48% respectively. Among the 3721 females having malaria during the period, 56.57% were pregnant, while 43.43% were not pregnant (Figure II).

Table 2 showed the age related prevalence of malaria among pregnant and non-pregnant patients. Of the 3721 female malaria patients attending the hospital during the period, 29.56, 28.73 and 23.68% were aged 21 - 30, 11 – 20 and 31 – 40 years respectively.

Table 1: Overall prevalence of malaria among patients attending Daura General Hospital

Type of Patient	Frequency	Percentage
Children	1119	13.30
Women	3721	44.23
Men	2607	30.99
Elderly	966	11.48
Total	8413	100.00

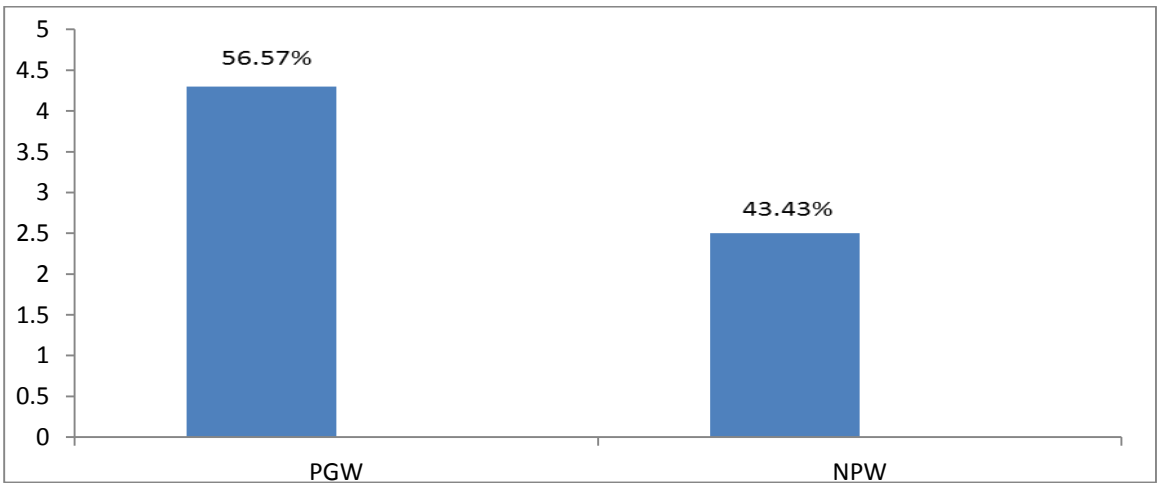


Fig. II: Malaria prevalence among women attending Daura General Hospital

Table 2: Percentage age distribution of pregnant (PGW) and non – pregnant women (NPW) attending Daura General Hospital

Age distribution (years)	Pregnant	Non Pregnant	Overall
11 – 20	32.68	23.58	28.73
21 – 30	25.89	34.34	29.56
31 – 40	21.0	27.10	23.68
41 – 50	20.38	14.98	18.03
Total	56.75	43.43	100

However, among the PGW, the 11 – 20 years age bracket recorded the highest prevalence rate (32.68%) followed by the 25.89% prevalence in the 21 – 30 years age group.Among the NPW, the 21 – 30 years age group had the highest prevalence (34.34%) and was followed by the 27.10% recorded among the 31 – 40 years group. In all cases, the 41 – 50 years group recorded the lowest malaria prevalence. The PGW recorded higher prevalence than the NPW among the 11 – 20 years group but not in the other age groups.

Table 3 shows the seasonal distribution of malaria prevalence among the PGW and NPW. Highest overall malaria prevalence rate (39.91%) was recorded during the late rainy season (LRS, July - September) and was followed by the 22.55% observed during the early dry season (EDS, October - December) months. Similarly, the PGW and NPW recorded the highest prevalence rates (43.42 and 35.33% respectively) during the LRS period and the lowest values during the ERS period for the NPW and LDS for the PGW. Malaria prevalence rates in the PGW were higher than those of the NPW during the LRS and EDS periods but not so during the remaining two seasons.

Table 3: Percentage seasonal distribution of malaria prevalence among PGW and NPW

Season	Pregnant women	Non–pregnant women	Overall
Late rainy season (July - September)*	43.42	35.33	39.91
Early dry season (October - December)	23.13	21.72	22.55
Late dry season (January - March)	16.39	23.45	19.76
Early rainy season (April - June)	17.01	19.49	18.09
Total	100.00	100.00	100.00

*Four months was used to compute the LRS values

Across months (Figure III) malaria prevalence rates in the PGW rose above the overall and NPW values during the months of August to October 2014, but fell below the other group values for the rest of the period (November 2014 – July 2015) studied. The overall malaria prevalence trend was also higher than the NPW values during August to October 2014, while the NPW values stayed above overall values from November 2014 to April 2015 after which values clustered until July when NPW values went up again.

Table 4 showed the drug management of malaria among the PGW. Generally, sulfadoxine/pyrimethanin preparations were indicated for malaria prevention during the second trimester, especially after foetal quickening has been observed and maintained as a monthly routine until the last month pre-delivery.

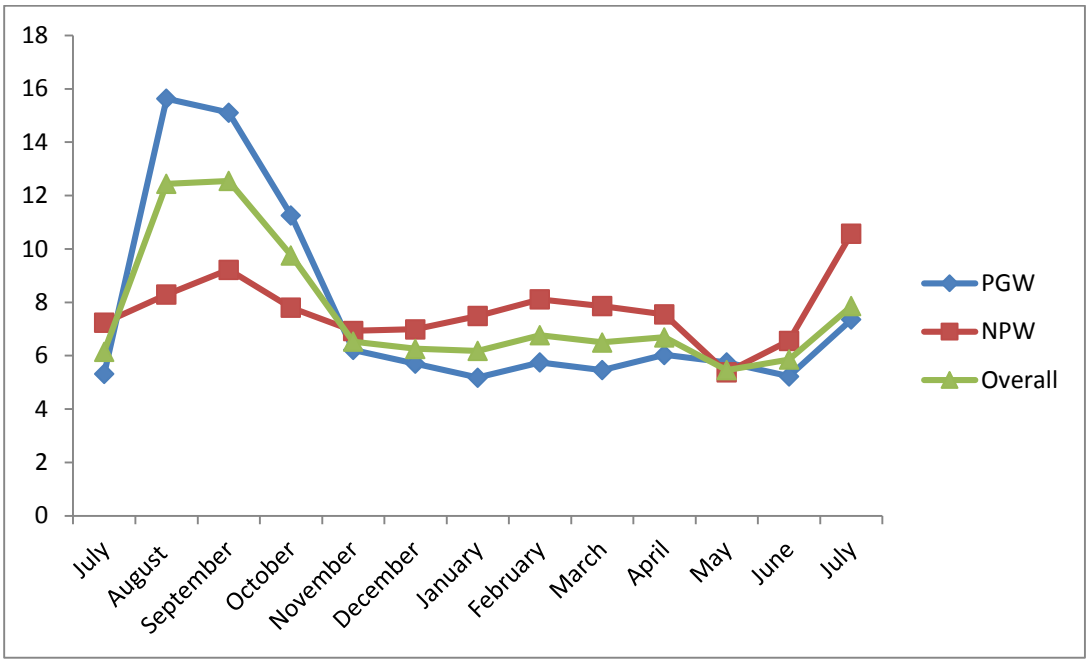


Fig. II: Monthly distribution of malaria prevalence among PGW and NPW attending Daura General Hospital

Table 4: Drug management of malaria in pregnant women attending Daura General Hospital

Indication	Drugs	1st Trimester	2nd Trimester	3rd Trimester
Malaria prevention	Sulphadoxine/pyrimethamineE.gFansidarmaloxine	-	(Once quickening is noted) Monthly	Monthly till last month before delivery
Cure/treatment	-Quinine SO_4 - Arthesunate - Arthemeter/ lumefantrin - α – β Arteeter -Arthemeter	-Quinine SO_4 -α – β Arteeter for those not tolerant to Quinine SO_4	- Quinine SO_4 - Arthesunate - Arthemeter/lumefantrin - α – β arteeter -Arthemeter	- Quinine SO_4 - Arthesunate - Arthemeter/ lumefantrin - α – β arteeter -Arthemeter
Analgesics	-Paracetamol -Diclofenac	-Paracetamol	-Paracetamol -Diclofenac	-Paracetamol
Electrolyte vitamins	-Normal saline -Dextrose saline -Regular antenatal multivitamins	-Normal saline -Dextrose saline -Regular antenatal multivitamins	-Normal saline -Dextrose saline -Regular antenatal multivitamins	-Normal saline -Dextrose saline -Regular antenatal multivitamins

For cure and treatment practices, quinine SO_4, arthesunate, arthesunate/lumefantrin and α - β arteate preparations were indicated across all trimesters, with the other drugs being prescribed when the patient is not tolerant to quinine SO_4. Analgesics such as paracetamol and diclofenac were also being prescribed as indicated in table 4, while antenatal multivitamins were routinely given. Normal saline and dextrose saline were also indicated to aid electrolyte balance and nutrition during acute malaria cases.

Malaria remains a leading cause of out-patient visit and hospital admission in sub-Saharan African (SSA) countries as also shown by the figures obtained in the present study. The higher

prevalence rate among women in this study is in agreement with WHO (2014) malaria report that in endemic countries of Africa, pregnant women and children bear the brunt of the burden of malaria disease more than other people in the same environment.

This is also confirmed by the higher prevalence obtained in PGW than NPW in this study. According to Uko *et al*. (1998), in highly endemic malarious areas such as Nigeria, where semi-immune adults usually have substantially acquired resistance to local strains of plasmodia, the prevalence of clinical malarial is higher and its severity greater in PGW than NPW.

The higher malaria prevalence rate among PGW of 11 – 20 years age bracket could be explained by the fact that there is continuous development of malaria immunity in older women (Dicko *et al*., 2003) thus, younger maternal age is an independent risk factor for malaria in pregnancy (Espinoza *et al*., 2005). Again, Brabin (1996) stated that cell mediated responses to malaria antigens are more markedly suppressed in first than in subsequent pregnancies because immunological memory from first pregnancy is retained. However, Adetioye *et al.* (2007) reported higher malaria susceptibility among PGW of 36 – 39 years age bracket in south western Nigeria, while in the semi-arid zone of Daura study area, such higher prevalence was recorded among the non–pregnant 21 – 30 and 31 – 40 years age bracket.

The higher malaria prevalence recorded during the LRS months of July to September is in agreement with the report of Ayanda (2009) in north central Nigeria that malaria was highest during this period of the year. It is known that rainy season presents favorable environmental conditions that enhance mosquito breeding and survival, through proliferation of larval habitats and improved humidity even in semi-arid areas like Daura (Himeiden *et al*., 2005).

The ultimate goal of malarial control is to prevent mortality and reduce socioeconomic losses by reducing morbidity through progressive healthcare improvement (WHO, 1993). Therefore, regular chemoprophylaxis as practiced in Daura General Hospital in combination with strategic treatments are good drug management approaches that would help to mitigate the disease outcomes (Warrell and Gilles, 2002). However, the use of quinine sulfate rather than arthemisinin combined therapy (ACT) as first-line drug for malaria treatment is contrary to the recommendations of MIS (2010). There could be several reasons for this alternative approach, including informed choice based on practical clinical results with the use of the indicated drugs in the study area. Indeed, many indicators suggest that more than 70% of children and probably other population cohorts treated for malaria in Nigeria receive chloroquine(MIS, 2010).

CONCLUSION

The present study highlighted the high prevalence of malaria in all population cohorts visiting Daura General Hospital, Katsina state from July 2014 to July 2015, with prevalence rates being higher in pregnant than non-pregnant women. There was a strong seasonal influence on disease prevalence, with LRS period recording the highest prevalence rates. Routine drug management of the disease was being practiced among the PGW with quinine sulfate being adopted as the first-line drug for malaria treatment.

RECOMMENDATION

We recommend improvements in advocacy activities on intervention control measures among women with special focus on pregnant ones in the study area.

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