PREVALENCE AND FACTORS ASSOCIATED WITH MALARIA TREATMENT AMONG PREGNANT WOMEN IN SELECTED RURAL AND URBAN HEALTH CENTRES IN OSUN STATE

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ABSTRACT: *Background: Malaria is one of the killer diseases worldwide majorly transmitted by the bite of infected female Anopheles mosquitoes. Malaria during pregnancy remains a major public health concern in many sub-Saharan African countries with Nigeria having the highest prevalence rate (27%).* ***Purpose:*** *This study was therefore designed to assess the prevalence and factors associated with treatment of malaria among pregnant women in selected rural and urban health centres in Osun State, Nigeria.* ***Materials and Methods:*** *Two hundred consenting pregnant women were selected using a multi-stage sampling technique from eight PHCs from Olorunda and Osogbo LGAs. The study was a facility-based, cross-sectional comparative survey using semi-structured interviewer-administered questionnaires Descriptive statistics, Chi-square tests and logistic regression were used to analyze data and the level of statistical significance was set at α ≤ 0.05.* ***Results:*** *Mean age of 28.29±7.23 and 28.37±6.90 for rural and urban PHCs respectively. All the respondents are Yoruba, almost two-thirds and more than half were Muslims and Christian in rural and urban LGAs respectively. The sero-prevalence of malaria was higher among women in urban PHCs (11%) compare to women in rural PHCs (4%) with cumulative sero-prevalence of 7.5% for both LGAs, the health-seeking for women in rural area is better compare to those women in urban area.* ***Conclusion:*** *This study provides a better understanding of malaria in pregnancy in the study areas with a clear contrast on prevalence, health-seeking behaviour and treatment practice between the target groups two LGAs.*

KEYWORDS: Malaria Treatment, Pregnant Women, Health Centres, Osun State Nigeria

INTRODUCTION

Malaria is a parasitic disease of tropical origin that is caused by five species (*P. falciparum, P. malaria, P. ovale, P. vivax, and P. knowlesi*) of the genus protozoa and transmitted by the bite of infected female Anopheles mosquitoes (Fana, Bunza, Anka *et al*., 2015). In malaria endemic areas, pregnant women are the highest group for malaria infection and to develop a severe form of the disease that could result in mortality.

It has been reported that in sub-Saharan Africa, malaria can cause as many as 10,000 cases of malaria-related deaths in pregnancy per year (WHO, 2020). Nigeria contributes to 27% of all cases globally, which makes it the highest contributor of all the countries. The number of deaths of malaria has gradually reduced from 736,000 to 409,000 in 2019, with African region accounting for the highest number of deaths. under 5 children are the most vulnerable victims of malaria, yet to develop immunity against malaria accounting for 67% of the deaths globally.

Pregnant women with malaria have an increased risk of abortion, stillbirth, premature delivery and low-birthweight infants which may be due to combination of stresses which, on one hand, is directed at ensuring the survival of the fetus and, on the other, at combating the parasite (Saba, Sultana and Mahsud, 2008).

Therefore, the most substantive malaria prevention and control measures as recommended by World Health Organization (WHO, 2004) include a three-pronged strategy for control of malaria in pregnancy in Africa including case management (prompt treatment with highly effective drug), use of insecticide-treated nets (ITNs) and intermittent preventive treatment (IPTp), the administration of a full treatment course of an effective antimalarial at regular antenatal visits, usually a month apart (Rogerson, 2017).

METHODOLOGY

Study Population

The study was carried out in one rural and urban Local Government Areas in Osogbo, Osun State, Nigeria. Osogbo is the state capital of Osun state with a landed area of about 835 hectare and population projection of over 3 Million people as at 2006 population census. The climate in Osogbo is tropical with two seasons; October to February (dry season) and March to July rainy season. The average daily temperature is 32ºC with a minimum temperature of 19ºC and a maximum temperature of 35.9ºC14. Malaria transmission is usually intense in the rainy season in the study areas. The study population were pregnant women residing within Osogbo and Olorunda Local Government Areas. Osogbo (Urban) and Olorunda (Rural) are two of the largest urban and rural local governments in the state with the highest population.

Inclusion Criteria

All pregnant women residing within Osogbo and Olorunda LGAs that are attending PHCs within the LGAs for their ANC services and gave consent to participate were included in the study.

Exclusion criteria

All pregnant women who met the inclusion criteria but that had any pregnancy related complications like eclampsia; high blood pressure etc. were excluded from this study.

Sample Size determination

Sample size for this study was estimated using the Leslie Kish formula for single proportion which is as follows:

$$N = \frac{Z^2 pq}{d^2}$$

N= Minimum sample size

Z= Standard normal deviation set at 1.96 normal interval

p= Estimate of prevalence of malaria in pregnancy.

The minimum sample size was determined using prevalence derived from a study (Sero-prevalence of malaria, hepatitis b and syphilis among pregnant women in Osogbo, Southwestern Nigeria by Adeleke *et al*., 2013) which was 13%

q= Proportions that does not have the characteristics being investigated

(q=1-p)   q= 1 - 0.13= 0.87

d= Degree of accuracy set at 0.05 (precision set at 5% significant)

Therefore, the sample size $N = \frac{(1.96)^2 \times 0.13 \times 0.87}{0.05^2}$

$$N = \frac{0.435}{0.0025} = 173.7 \sim 174$$

A non-response rate of 10% of 174 = 174x10% = 17.4 ~ 17

Therefore, 17 will be added to the sample size calculated (174) to make the sample size 191 in order to address issues of incomplete response (174+17 =191)

N= 191

The total sample size = 191

However, the researcher decided to approximate the total sample to 200 hundred in order to improve the statistical power and to be able to divide the respondents among the PHCs equally.

Sampling procedure

A multi stage sampling procedure was used to select 200 pregnant women among all the women attending ANC services at PHCs in the study areas.

The first step was to randomly select four public urban and rural PHCs from the two LGAs (Urban PHC selected in Oshogbo LGA are Oke-Oluwatosin PHC , Ago-Ayo PHC, Ayepe PHC and Oke Baale PHC; while the rural PHCs selected from Olorunda LGAs are Atelewo PHC, Ota-Efun PHC, Enikan-Oyun PHC and Biiro Fagbemi PHC) (Nigeria Health Facility Registry (HFR), Federal Ministry of Health, 2019).

The second stage was to split the number of intending respondents by the number of selected PHCs (200÷ 2 = 100)

The third stage involved allocation of 100 respondents to all the four PHC, with each PHC getting 25 allocation samples of respondents

The fourth stage was the selection of the respondents by simple random sampling in PHCs with more than 25 respondents (For example Atelewo, Ota Efun, and Enikan-Oyun).

Data Collection Method

Rapid diagnostic Test (RDT) was used to measure the prevalence of the malaria parasite among the respondents and this was specifically done by the Healthcare workers at those PHCs. The procedure involved taking a blood sample from the thumb of the respondents. The respondents fourth finger's were disinfected and allowed to air dry; the fingers were pricked, with the first blood wiped off the finger with cotton wool, then the inverted cup or capillary was used to draw whole blood specimens. The blood was transferred into the marked cassette with the ID of the respondent. The results was then read and recorded within a minimum of 15 minutes and maximum of 30min (per kit's manufacturer's instructions)

The quantitative method was used for the other part of the data collection; Primary data was collected in this study through the use of semi-structured interviewer-administered questionnaires. The questionnaire was measured using a 30-point scale; scores between ≤15, and >15≤30 were categorized as negative health-seeking behaviour and positive health-seeking behaviour respectively, while similar scaling was used for other sections including the practice and factors influencing malaria treatment. The questionnaire was structured based on the information obtained from literature on their health-seeking behaviours, level of practice of malaria treatment, factors responsible for their practice in addition to the socio-demographic characteristics of the respondents.

The questionnaire was divided into four sections which are:

• Section A: Socio-demographic characteristics of respondents

• Section B: Health-seeking behaviors related to malaria treatment among respondents

• Section C: Practice of malaria treatment among respondents

• Section D: Factors associated with practice of malaria treatment among respondents

Instrument

There was an extensive review of literature to ensure appropriate content and face validity. Construct validity was also ensured by making sure that variables in the theoretical framework are well represented in the instrument. The instrument was also given to my supervisor as well

as some research experts in the Faculty of Public Health Babcock University to help ascertain the quality of the instrument. The instrument was also translated to Yoruba Language and was translated back to English to ensure that it retained its original meaning. The drafted questionnaire was field tested among 10%of the sample size, which was (20 for Urban LGA and 20 for Rural LGA) among similar respondents in Abere Health Clinic in Ede North LGA (urban) and Ibokun PHC in Obokun LGA (rural) which both has a similar socio-demographic characteristic with the study site. The retrieved field-tested questionnaire was however subjected to Cronbach alpha analysis and a reliability coefficient of 0.81 was recorded which is more than 0.7 that was initially predicted.

Data Management and Analysis

Copies of the questionnaire collected were checked for completeness and accuracy. They were cleaned, sorted, coded using a developed coding guide. Data was processed and analysed using Statistical Packages SPSS version 25. Descriptive and Inferential statistics were used to present the data with frequency table, mean with standard deviation, chi square; student t-test to compare prevalence between the two LGA and Study settings and logistic regression to do a predictive description of the data.

Ethical Consideration

Ethical approval was obtained from the Babcock University Health Research Ethics Committee and Osun State Health Research Ethics Committee at the Primary Healthcare Centre Management Board at Kelebe Osogbo prior to the commencement of the study due to the level of the evasiveness of the study that requires drawing of blood samples by the Healthcare workers. Verbal informed consent was obtained from participants after providing them with information and benefits of the research. With collaboration with their regular healthcare providers, the respondent was also assured that the blood obtained was only for RDT as they were also there when the test was conducted. that the information provided by them will be kept confidential so as for them to be sincere with the responses they provided. They were also informed that they are free to withdraw from the research if need arises.

RESULT

This presents the findings of the study which assessed the prevalence and factors associated with malaria treatment among pregnant women in selected rural and urban health centres in Osun state. Two hundred pregnant women between the ages of 15 to 45 were interviewed at eight Primary Healthcare Centres (PHCs) at two different Local Government Areas (Urban and Rural LGAs) in Osun state. The study employs a clustered sampling method to select four PHCs each from Osogbo LGA and Olorunda LGA respectively, where the former an urban LGA and the latter a rural LGA. The PHCs selected from the urban LGA are: Oke-Baale PHC, Ago-Ayo PHC, Oke Oluwatosin PHC and Ayepe PHC while the PHCs selected from the rural LGA are: Atelewo PHC, Ota-Efun PHC, Enikan-Oyun PHC and Biiro-Fagbemi PHC. This study assessed an equal number of respondents from each PHC (25 pregnant women/ 25 questionnaires were administered to the participants at eight PHCs (25x8 = 200) making a total of 200 questionnaires that were administered in this study).

The Socio-demographic Characteristics of the Respondents

It was observed that the age group 25-39 years had the highest participants in both the rural PHCs and urban PHCs, 58 (58%) and 61 (61%). Most of the participant in the rural PHCs practiced Islam, 62 (62%) while most of the participants in the urban PHCs practiced Christianity 55 (55%). Most of the participants in the rural PHCs had secondary education (56%) while tertiary education was the highest in the urban PHCs (46%). Tertiary education was recorded to be the highest form of education of the husbands of the participants, 55% in rural and 66% in urban PHCs. Trading/Business was the highest occupation at both PHCs, 40% in rural and 32% in urban PHCs. Most participants in the rural PHCs were in their 3rd trimester (39%) while most of the participants in the urban PHCs were in their 2nd trimester (35%). Polygamy was the highest type of marriage in both PHCs. Most of the participants had one child, rural (20%) and urban (30).

Most of the participants resided in flat apartments, 49% in the rural PHCs while most of the participants in the urban PHCs resided in bungalow apartments (53%). Most of the participants (62%) in the rural PHCs did not disclose their average income, however (9%) each earn between 1-9999, 10000-19999 and 30000-39999, however, most of the participants (20%) in the urban PHCs earned between 1-9999. A larger percentage (75%) of the urban PHCs do not have a family doctor, while 44% were reported to have a family doctor.

Table 4.1 Socio demographic characteristics of the participants

Variables	Rural, N = 100 (%)	Urban, N = 100 (%)
Age group		
15-24 years	36 (36)	34 (34)
25-39 years	58 (58)	61 (61)
>40 years	6 (6)	5 (5)
Religion		
Islam	62 (62)	40 (40)
Christianity	36 (36)	55 (55)
Traditional	-	3 (3)
No response	2 (2)	2 (2)
Level of education		
No Formal Education	2 (2)	9 (9)
Primary	2 (2)	9 (9)
Secondary	56 (56)	36 (36)
Tertiary	35 (35)	46 (46)
No response	5 (5)	-
Husband level of education		
No Formal Education	2 (2)	4 (4)
Primary	-	1 (1)
Secondary	25 (25)	20 (20)
Vocational	11 (11)	2 (2)
Tertiary	55 (55)	66 (66)
No response	7 (7)	7 (7)
Occupation		
Civil Servant	4 (4)	5 (5)
House Wife	14 (14)	5 (5)

Artisan	13 (13)	1 (1)
Labourer/Cleaner	4 (4)	1 (1)
Student	6 (6)	5 (5)
Unemployed	3 (3)	28 (28)
Trading/Businesswomen	40 (40)	32 (32)
Professional	6 (6)	9 (9)
Others ()	4 (4)	13 (13)
No response	6 (6)	1 (1)
how long have you been married		
0-2	37 (37)	48 (48)
3-5	19 (19)	27 (27)
6-8	14 (14)	7 (7)
9-11	8 (8)	3 (3)
>11 years	9 (9)	-
No response	13 (13)	15 (15)
what is the stage of your pregnancy		
1st Trimester	13 (13)	19 (19)
2nd Trimester	11 (11)	43 (43)
3rd Trimester	39 (39)	35 (35)
I don't know	37 (37)	3 (3)

Variables	Rural, N = 100 (%)	Urban, N = 100 (%)
What is your type of marriage?	32 (32)	10 (10)
Polygyny		
Monogamy	48 (48)	80 (80)
No response	20 (20)	10 (10)
how many children do you have		
1	20 (20)	30 (30)
2	23 (23)	12 (12)
3	12 (12)	3 (3)
4	2 (2)	-
No response	43 (43)	55 (55)
what type of house do you live		
Bungalow	29 (29)	53 (53)
Flat apartment	49 (49)	39 (39)
Duplex	5 (5)	4 (4)
Other	9 (9)	1 (1)
No response	8 (8)	3 (3)
Average monthly income		
1-9999	9 (9)	20 (20)
10000-19999	9 (9)	11 (11)
20000-29999	6 (6)	7 (7)
30000-39999	9 (9)	4 (4)
>50000	5 (5)	1 (1)
No response	62 (62)	2 (2)
Do you have family doctor		

Yes	44 (44)	23 (23)
No	47 (47)	75 (75)
Don't know	9 (9)	2 (2)

Sero-Prevalence of Malaria in the Study Sites

Based on the positivity of the RDT, the cumulative prevalence of malaria among the participants was 7.5%, the urban PHCs had 11 (11%) positive malaria cases across their PHCs while the rural PHCs had 4 (4%) positive malaria across their PHCs.

In the rural PHCs, only Atelewo and ota-efun had positive malaria cases, 3(75%) and 1(25%) respectively. In the urban PHCs only Oke-baale and Ago-ayo had positive malaria cases, 8(72.7%) and 3(27.3%) respectively.

Table 4.2 Sero-prevalence of malaria in the study sites

Variables	N = 200	%
RDT sero-positivity		
Positive	15	7.5
Negative	185	92.5
Prevalence of malaria in the study sites, N =15		
Rural PHCs		
Positive	4	4.0
Negative	96	96.0
Urban PHCs		
Positive	11	11.0
Negative	89	89.0
Rural PHCs		
Atelewo	3	75.0
Ota-efun	1	25.0
Enikan-oyun	0	0
Biro-fagbemi	0	0
Urban PHCs		
Oke bale	8	72.7
Ago-ayo	3	27.3
Oke oluwatosin	0	0
Ayepe	0	0

The Health Seeking Behaviors Related to Malaria Treatment among Respondents

Only a few of the participants were on NHIS, eight participants in the rural PHC and nine participants in the urban PHCs. Most of the participants in this study registered for ANC at their 1st trimester, twenty-seven participants in the rural PHCs and seventy-three in urban PHCs, there was an association of this behavior within the rural and urban participants (P = 0.001). Many of the participants in the rural PHCs (55) believed that every symptom related to fever is an onset of malaria participants while many of urban participants (63) did believe

otherwise. Most of the rural participants (55) would visit any hospital as the first action if they experience any health problems, meanwhile, most of the urban participants (61) would visit any pharmacy as the first action if they experience any health problems. Most of the participants (60 rural participants and 74 urban participants) claimed that they do follow the doctor's advice in treating malaria. 37 rural participants prefer to go to PHCs for treatment while 69 urban participants would prefer to PHC for treatment.

Table 4.3. The health seeking behaviors related to malaria treatment among respondents

Variables	Rural	Urban	Chi-square significance
Are you on NHIS, if yes mention the name of the facility you registered			0.983
Yes	8	9	
No	80	89	
When did you register for ANC			0.001
First trimester	27	73	
Second trimester	27	23	
Third trimester	12	3	
I did not register	20	0	
Do you believe that every symptoms related to fever is an onset of malaria			0.001
Yes	55	36	
No	34	63	
If you are experiencing any health problems, what is the first action that you will take			0.001
Visit any Hospital	74	33	
Visit any Pharmacy	12	61	
Others	0	4	
Whose advice do you follow in treating malaria			0.194
Doctor	60	74	
Pharmacist	1	8	
Nurse	1	2	
Family/friends	4	9	
Which hospital do you prefer to go for treatment			0.001
PHC	37	69	
General hospital	38	10	
Teaching/tertiary hospital	10	15	
Others	3	1	

The Practice of Malaria Treatment among Respondents

For the two PHCs, there were few episodes of malaria in the past three months, rural PHCs (38) and urban PHCs (28), with significant association (P = 0.05). In the last three months, most of the participants (63 in the rural PHCs and 24 in the urban PHCs) have been taking their medicine based on doctors' advice, with significant association (P = 0.03). Most of the rural participants (26) took their drug once while most of the urban participants (25) took their drug three times. Most rural participants (47) and urban participants (65) reported that they were not given drugs for malaria treatment when they did not have malaria, with significant association (P = 0.003).

Table 4.4 The practice of malaria treatment among respondents

Variables	Rural	Urban	Chi-square significance
In the past three months have you had any episode of malaria			0.05
Yes	38	28	
No	53	71	
In the past three months, how did you take your medicines to treat malaria			0.03
Based on doctors' advice	63	24	
Using my past experience to buy drugs for us	3	8	
Following Friends and Family advice	0	2	
Others	1	2	
How many times did you use the drugs			0.001
1.00	26	4	
2.00	23	5	
3.00	17	25	
7.00	4	0	
Was it the same drug you have been using before			0.002
Yes	25	5	
No	27	28	
Were you given drugs for malaria treatment even when you did not have malaria			0.003
Yes	18	6	
No	47	65	

Factors Associated with Practice of Malaria Treatment among Respondents

The mean cost of malaria treatment was reported to be N1825 ± 1156.1, the minimum cost was 800 and the maximum cost was 5000 in the rural PHCs while the mean cost of treatment in the urban PHC was N1432 ± 376.1 and minimum cost N200 and maximum cost was N2500. Some of the rural participants bought their drugs from chemists (36) while most of the urban participants (70) did not buy drugs from pharmacy and chemist. The most common anti-malaria bought from pharmacies was fansidar in the rural PHCs while Arthemeter was the most commonly used anti-malaria in the urban PHCs. Most of the rural PHCs participants (30) reported that the drug was similar to what they would get at the health center, while most of

the urban PHCs participants (21) said the drugs were not similar to what they would get at the health center. Most of the participants at the rural PHCs (47) preferred to get treatment from health centres while just 12 participants preferred to buy from health centres. Most of the participants preferred their choices because the drugs would work effectively.

Table 4.5 Factors associated with practice of malaria treatment among respondents

Variables	Rural PHCs	Urban PHCs
Average cost on malaria treatment per month		
Mean ± S.D	1825.9 ± 1156.1	1432 ± 376.1
Minimum	800	200
Maximum	5000	2500
Do you buy anti malaria drugs from pharmacy or chemist just to save money		
Yes	32	21
No	36	70
What is the name of the drug		
Mode (*commonly used*)	Fansidar	Arthemeter
Is the drug the same with the one you are given from the health centers		
Yes	30	4
No	24	21
Which one do you prefer		
Bought	14	13
Health Centre	47	12
None of the two	2	4
Reason why you prefer the one you prefer		
Works effectively	13	10
Doctors' prescription	12	2
Cost effective	4	0
Because it's free	5	0
Do you have any significant others buy you antimalarial drugs		
Husband	11	34
Siblings	1	10
Father	3	2
Mother	1	1
How often does your significant others buy you antimalarial drugs		
All the time	15	11
Once in a while	24	34
Rarely	4	10
Never	19	4

DISCUSSION

This study was set out to examine the prevalence and factors associated with treatment of malaria among pregnant women. It was found out that the cumulative prevalence of malaria at the PHCs is low. It was a study conducted among pregnant women of different levels of education, though a higher percentage of the pregnant women in the rural PHCs had secondary level of education while a number of pregnant women in the urban PHCs had tertiary education. The level of education has shown to be a great influence and association on the knowledge of respondents about malaria along with malaria control (Oladimeji *et al.*, 2019).

The respondent age ranges between 15 to above 40 at both rural and urban LGAs with a mean age of 28.29±7.23 and 28.37±6.90 for rural and urban PHCs respectively. It was observed that more than half and nearly two-third of the respondents fall into the 25-39 age category probably because of the fact that the National Demographic Health Survey (NDHS) (2018) reported that the median age at first birth is between 25-49 years age in Nigeria.

The study also revealed a high preference of the anti-malaria drug among respondents who accessed rural PHCs which was as a result of the drug working effectively which was then concluded to be doctors' prescription, and cost-effectiveness and the preferred the anti-malaria drug because it was free.

The results from this study also revealed the variation in preference in where the anti-malaria drugs were obtained from, with larger number of participants from the rural PHCs preferring anti-malaria drugs administered at the health centre to that which is purchased at the pharmacy/store on the contrary to the number of participants from the urban PHCs.

In conclusion, malaria has been one of the most challenging infectious diseases to eradicate in Africa. This study showed that the cumulative prevalence of malaria at the PHCs is low. In the two LGAs, the prevalence of malaria in the rural PHCs was lower than those of Urban. The major factors that were identified with the practice of malaria treatment is the cost of monthly treatment (which is higher in rural than the urban PHCs). This study also revealed that women in the rural areas had malaria than those in the urban areas, and in treatment of malaria, more women in the rural area than women in the urban areas treat malaria based on doctor's advice while other treatment advice was from using past experience and following friends and families' advice. Hence, the practice of malaria treatment among the respondents of this current study is high and their use of drugs was based on doctors' advice and followed adequate steps towards the treatment of malaria.

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