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Occurrence of Malaria in Children under Five Years: Knowledge, Attitudes and Perceptions among Mothers in a Nigerian Semi-Urban Area

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Authors' contributions

This work was carried out in collaboration between all authors. Author RSH conceived and designed the study, performed statistical analysis, wrote the protocol and the first draft of the manuscript. Author EUA was central to the conception of the study and critically revised the paper. Authors BEW, TDH and JBB were involved in the laboratory analyses. Authors TDH, JBB and BEW managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aims: This study was conducted to determine the occurrence of malaria among children underfive years and to assess the knowledge, attitudes and perceptions of the children's mothers regarding malaria and preventive measures.
Study design: The study was cross-sectional in design.
Place and Duration of Study: The study was conducted in Gboko Local Government Area of Benue State, Nigeria, between May-September 2012.
Methodology: Children under five years that attended three hospitals (Atuna, NKST and General Hospital) for malaria diagnosis with their respective mothers were enrolled for the study. Thin and Thick blood films were prepared for parasitological examination. Questionnaires were administered to children's mothers to collect socio-demographic

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data, knowledge, attitudes and perceptions regarding malaria and preventive measures.
Results: Of the 220 children examined, 14.50% (32/220) were infected with malaria. Males and females were similarly infected (14.50% vs 14.60%) with no significant difference (χ^2=0.000, *p=.989*). With regards to the socio-demographic data of the children's mothers, malaria was 100.00% (4/4) (χ^2=*24.40, p=.000*) among children whose mothers were within the age group [41-50] years and among children whose mothers are divorced, 45.50% (5/11) (χ^2=*12.50, p=.006*). Occurrence of malaria was high among children whose mothers claimed to have attained a tertiary level of education, 17.80% (16/90) (χ^2= *1.37, p=.503*) and among children whose mothers are traders, 25.00% (13/52) (χ^2= *8.27; p=.142*), with no significant difference. Children's mothers had good knowledge of: malaria, 99.50% (219/220) (χ^2= 1.45**,** *p=.484***)**; its vectors, 79.50% (175/220) (χ^2=14.82, *p=.001***)** and aetiological agent, 74.52% (164/220) (χ^2=63.15, *p=.000*). Likewise, 90.90% (200/220) of the children's mothers perceived that high temperature was a common malaria symptom (χ^2= 23.66, *p=.000*) and 70.31% (161/220) of them always referred their children to a hospital for treatment (χ^2=70.81, *p=.000*). With regards to the mothers' attitude towards prevention, 85.53% (188/220) used Insecticide Treated Nets (ITNs) as preventive methods (χ^2= 16.38, *p=.003*).
Conclusion: This study is the first epidemiologic study on childhood malaria in the area and it adds to the existing data on malaria in Nigeria and sub-Saharan Africa as a whole. Mothers of the children had good knowledge of malaria and its aetiological agent, as well as its vector. They also had good attitudes and perceptions towards the use of preventive measures. It is recommended that concerted efforts should be built between the Government and the private sector to scale-up the distribution of ITNs to households so as to significantly reduce the occurrence of malaria in children under five years.

Keywords: Children; malaria; women; Gboko; Nigeria.

1. INTRODUCTION

Despite tremendous efforts made to reduce the morbidity and mortality of malaria among children and pregnant women around the world over the past decade, malaria still remains a scourge in sub-Saharan Africa. Recent estimates from World Health Organization suggest that 3.3 billion people are at risk of the disease in 106 countries and territories [1]. In 2010, about 216 million cases of malaria occurred and resulted in 655,000 deaths of which 91% in sub-Saharan Africa and 86% were children under five years [1]. Malaria is the third leading cause of death in children under five years worldwide, after pneumonia and diarrheal diseases [2].

In Nigeria, malaria remains a major public health problem with an estimated 100 million cases and over 300,000 deaths per year. Children under five years accounts for 60% of outpatient visits and 30% of hospitalizations with 2-4 attacks annually. Prevalence of the disease among children varies from 27.6% in the south east to 50.3% in the south west [3]. Mothers play very important role in the management of any childhood disease. In malaria endemic areas majority of mothers can identify the disease with fever and even manage it using commonly sold antimalarials in the markets without necessarily going for laboratory examinations. In Nigeria, These practices are very common among inhabitants of rural, semi-urban and even urban dwellers that have not given proper attention to the implementation of the prescribed control measures mostly due to poverty, negligence and illiteracy. Therefore, having baseline data on childhood malaria and understanding mothers'

perceptions and practices regarding the disease is of utmost importance to tackle wrong malaria interventions in households. This study was conducted to determine the occurrence of malaria among children under five and to assess the knowledge, attitudes and perceptions of the children's mothers regarding malaria symptoms and preventive measures.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Gboko Local Government Area (LGA) of Benue State which is located at the central zone of Nigeria. The area is located at latitude 7º18'N and longitude 8º58'E. Gboko LGA has a land mass of about 2,264 square kilometres with a population of about 360,128 people making it one of the most populous Local Government in Benue State. The Local Government is bounded by Tarka and Guma LGAs to the North, Ushongo LGA to the South, Bukuru LGA to the West and Konshisha LGA to the Southwest.

The climate of the area is tropical, sub-humid with daily average temperature of about 28ºC and average annual rainfall of 1000mm. The rainy season starts from April to October, while the dry season starts from November to March.

2.2 Study Design and Blood Sample Collection

The study was cross-sectional in design and conducted between May - September 2012. Three hospitals namely: Atuna, NKST and General Hospitals all located within Gboko were visited. Children under five years that attended these hospitals for malaria diagnosis with their respective mothers were enrolled for the study. Prior to the commencement of the study, ethical approval was obtained from the Ministry of Health, Makurdi, Benue State. Permissions were also sought from the various hospital managements at the beginning of the study. However, mothers of the children were duly briefed on the significance of the study and they gave their consent before blood sample collection.

2.3 Malaria Parasite Microscopy

Preparation of thick blood films for malaria microscopy was made from children's blood samples using standard parasitological technique. Thick films were then examined under a microscope using oil immersion at x100 objective [4].

2.4 Questionnaire Administration

A questionnaire was issued to each mother to collect data on socio-demographic factors, knowledge, attitude and perceptions regarding malaria, its aetiological agent, symptoms, vector and preventive measures.

2.5 Statistical Analysis

Data were double entered in Microsoft Excel 2007 and analyzed using SPSS for windows version 18. Chi- square test was used to compare occurrence of malaria between sexes of the children and socio-demographic data of mothers, as well as to compare knowledge, attitudes and perceptions of the children's mothers regarding malaria in relation to their educational status.

3. RESULTS

Table 1 showed the occurrence of malaria infection in relation to sex of children, as well as socio-demographic factors of their mothers in Gboko, Benue State, Nigeria. An infection level of 14.50% (32/220) was observed out of the 220 children examined. Males and females were similarly infected (14.50% vs 14.60% respectively) with no significant difference ($\chi^2_{=}$ *0.000, p=.089*). In relation to the socio-demographic data of the children's mothers; children whose mothers are aged [41-50] years had the highest occurrence of malaria, 100.00% (4/4) than the other age groups with a significant difference ($\chi^2_{=}$*24.40, p=.000*). Children whose mothers are divorced/separated were significantly infected, 25.50 % (5/11) than those whose mothers are single (never married), 17.90% (7/39) and married, 11.80% (20/170) ($\chi^2_{=}$*12.50, p=.006*). In relation to educational and occupational backgrounds of the children's mothers, children whose mothers claimed to have attained a tertiary level of education and those whose mothers are traders had the highest infection with 17.80% (16/90) and 25.00% (13/52) respectively. However, there was no significant difference between occurrence of malaria and both educational ($\chi^2_{=}$*1.37; p=.503*) and occupational ($\chi^2_{=}$ *0.827; p= 1.42*) backgrounds of the mothers.

Table 1. Malaria among children under five years in relation to sex as well as socio-demographic factors of mothers in Gboko, Nigeria

Variables	Number examined	Number infected (%)	χ^2	P
Occurrence	**N=220**	**32 (14.50)**		
Sex			0.00	.989
Male	124	18(14.50)		
Female	96	14(14.60)		
Age group(years)			24.40	.000
< 31	144	17(11.80)		
[31–40]	72	11(15.30)		
[41-50]	4	4(100.00)		
Marital status			12.50	.006
Single	39	7(17.90)		
Married	170	20(11.80)		
Divorced	11	5(45.50)		
Education			1.37	.503
Primary	60	8(13.30)		
Secondary	70	8(11.40)		
Tertiary	90	16(17.80)		
Occupation			8.27	.142
Student	15	2(13.30)		
Farmer	38	7(18.40)		
Civil servant	56	5(8.90)		
Teacher	20	2(10.00)		
Trader	52	13(25.00)		
Nurse	39	3(7.50)		

Table 2 showed the knowledge, attitudes and perceptions of the children's mothers regarding malaria, its aetiological agent, vector, symptoms and preventive measures in relation to their educational level in Gboko, Benue State, Nigeria. Generally, mothers of the children had good knowledge of malaria, 99.54% (219/220) irrespective of their educational level ($\chi^2_{=}$ 1.45, *p = .484*). Mothers' knowledge regarding malaria, its aetiological agent and

vector varied significantly with mothers that had post-secondary education having better knowledge of the aetiological agent, 74.54% (164/220) (χ^2= 14.82, *p=.001*) and vector,79.54% (175/220) (χ^2= 63.15, *p=.000*). With regards to the mothers' attitude towards malaria, 73.20% (161/220) had the attitude of always referring their children to a hospital for malaria diagnosis, while 26.40% (58/220) referred to roadside drug vendors (χ^2= 70.81, *p=.000*). With regards to malaria symptoms, 90.90% (200/220) of the mothers perceived that high temperature (fever) was the common malaria symptom observed among the children; only few of them knew that diarrhea, 9.10%(20/220) and convulsion, 12.30% (27/220) were also symptoms that could appear during malaria (χ^2= 59.02, *p=.000*). Use of ITNs as preventive method was observed to be significantly higher, 85.45% (188/220) among the children's mothers than other preventive methods (χ^2= 16.38, *p=.003*).

Table 2. Knowledge, Attitudes and Perceptions of children's mothers towards malaria, itsaetiological agent, vector, symptoms and preventive measures in relation to their educational background

Variables	Educational Level of mothers (%)				χ^2	P
	Primary (N=60)	Secondary (N=70)	Tertiary (N=90)	Total (N=220)		
Knowledge of malaria					1.45	.484
▪ Yes	60(27.40)	70(32.00)	89(40.60)	219(99.54)		
▪ No	0(0.00)	0(0.00)	1(1.10)	1(0.45)		
Knowledge of aetiological agent					14.82	.001
▪ Yes	44(26.81)	42(25.63)	78(47.60)	164(74.54)		
▪ No	16(28.69)	28(50.07)	12(21.40)	56(25.40)		
Knowledge of vector					63.15	.000
▪ Yes	28(16.09)	57(32.62)	90(51.40)	175(79.54)		
▪ No	32(71.11)	13(28.98)	0(0.00)	45(20.45)		
Attitudes of mothers towards malaria					70.81	.000
▪ R.H	45(28.04)	28(17.43)	88(54.72)	161(73.20)		
▪ R.D.V	24(14.16)	42(72.47)	2(3.48)	58(26.40)		
▪ R.P	1(0.50)	0(0.00)	0(0.00)	1(0.45)		
Perceptions of mothers towards malaria symptoms						
Fever					23.66	.000
▪ Yes	59(29.52)	54(27.00)	87(43.50)	200(90.90)		
▪ No	1(5.08)	16(80.00)	3(15.00)	20(9.10)		
Diarrhoea					23.66	.000
▪ Yes	1(5.08)	16(80.00)	3(15.00)	20(9.10)		
▪ No	59(29.52)	54(27.00)	87(43.50)	200(90.90)		
Convulsion					59.02	.000
▪ Yes	0(0.00)	26(96.30)	1(3.70)	27(12.27)		
▪ No	60(31.10)	44(22.80)	89(46.10)	193(87.72)		
Use of preventive measures					16.38	.003
▪ ITNs	46(24.51)	68(36.21)	74(39.40)	188(85.45)		
▪ Windows/door nets	14(45.29)	1(3.27)	16(51.60)	31(14.09)		
▪ Prophylaxis drugs	0(0.00)	1(0.52)	0(0.00)	1(0.45)		

Keys: R.H: refer to hospital, R.D.V: refer to drug vendor, R.P: refer to pastor for prayer

4. DISCUSSION

The present study was conducted prior to the massive health education campaign undergoing in all the Local Government Areas and States of Nigeria with sole purpose of reducing malaria occurrence among pregnant women and children under five years known as the vulnerable groups. This study reports low malaria occurrence (14.50%) among children under five years attending health care facilities in Gboko metropolis when we refer to the general occurrence of childhood malaria in Nigeria. This low occurrence is likely the application of health education lectures regarding malaria preventive measures dispensed to the children's mothers during their visits to paediatrics or antenatal services in health care facilities. The reported occurrence is similar to 12.00% observed among children under five in rural Tanzania [5], but higher than 6.00% and 5.50% reported among children in Pakistan and Rwanda respectively [6,7]. This occurrence is far much lower than the average prevalence (49.40%) observed in the Central zone of Nigeria grouping six States (Benue, Nasarawa, Niger, Kogi, Kwara and the Federal Capital Territory). This Central zone is second to the South west zone which records the peak prevalence of malaria (50.32%) among children aged 6-59 months in Nigeria [3].

The sex-related occurrence among the children showed that both sexes are similarly infected; this reflects the equal exposure of these children to Anopheles mosquitoes' bites in the area. The high malaria occurrence in children whose mothers are traders, farmers, students, divorced, aged [41-50] years, as well as children whose mothers claimed to have post-secondary education is likely the lack of malaria preventive methods or the non-application of these methods by the mothers towards their children. It is also possible that such mothers spend longer hours in their various occupations thereby caring less towards the protection of their children.

The low infection rate observed among the children seems to be encouraging when we refer to the undergoing intensified health education campaign on malaria control and preventive measures in the country, though we did not conduct a retrospective study to really ascertain the level of malaria in the children below five years, but Houmsou et al. [8] reported high prevalence (76.72%) among pregnant women that attended antenatal clinics in the same area. The area is semi-urban with a lot of slums having pooled water, refuse dumps and several dirty gutters. These can easily help in the breeding and thriving of Anopheles mosquitoes. The study was conducted during rainy season which is the period of stable malaria transmission in the area.

Irrespective of the mothers' educational background, the study reflected mothers' good knowledge about malaria, its aetiological agent and vectors, but mothers that claimed having post-secondary education had better knowledge of these factors just because they might have had greater chances to read and know more about malaria. Good knowledge of these factors corroborates findings reported in Ethiopia, Ghana and Guatemala which are malaria endemic countries like Nigeria [9 -13]. With regards to the attitudes of the children's mothers regarding malaria, 73.20% of the children's mothers always referred their children to hospital with 54.72% of them having post-secondary education. This simply shows that malaria is easily perceived among mothers that have higher educational level. Positive association between level of education and improved perceptions of malaria was also reported in Southeast Nigeria and Zambia [14,15]. The majority of the children's mothers recognized high temperature (fever) (90.90%) as the main malaria symptom. This good attitude of these mothers is of utmost importance because it will help in the home management of the disease. This could be also one of the reasons why these mothers always referred their

children to hospital or a drug vendor to seek for treatment. On the contrary, good proportion of the mothers did not know diarrhoea (90.90%) and convulsions (87.72%) as malaria symptoms, this is likely because these symptoms appear during complicated or severe malaria which they never came across. The high level of malaria knowledge among the mothers in the present study reflected on the use of preventive measures as, 85.45% and 14.09% of them used ITNs and door/windows nets respectively for malaria prevention. The trend of using ITNs among these mothers has positively influenced their children behaviour as they might have obliged them to be always sleeping under ITNs. However, the link between good use of ITNs and increased knowledge of malaria among mothers in this study contrasts earlier studies that found low usage of ITNs among women that have good malaria knowledge in Kwara State, Nigeria and rural Ethiopia [9,16].

5. CONCLUSION

The present study is the first epidemiologic study on childhood malaria in the area. This adds to the data on malaria in Nigeria and sub-Saharan Africa as a whole. Mothers of the children had good knowledge of malaria and its aetiological agent, as well as its vector. They also had good attitudes and perceptions towards the use of preventive measures. It is recommended that concerted efforts should be built between the Government and the private sector to scale-up the distribution of ITNs to households, so as to significantly reduce the occurrence of malaria in children under five years. There is also the need to enhance health education through media, conferences, seminars, workshops using local dialects in semi-urban and rural areas; this will help in raising the knowledge and understanding of less or non-educated mothers on the good use of malaria preventive measures.

CONSENT

Permissions were sought from the various hospital managements at the beginning of the study and mothers of the children were duly briefed and informed on the significance of the study. Both the hospitals and children's mothers consented before blood sample collection.

ETHICAL APPROVAL

Prior to the commencement of the study ethical approval was obtained from the Ministry of Health, Makurdi, Benue State.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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