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*Full Length Research Paper*

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# Assessment of antimalarial drug use for children among mothers attending Bingham university teaching hospital in Nigeria

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**The aim of this study is to assess the use of antimalarial drug for children among mothers attending outpatient clinic in Bingham University Teaching Hospital. A cross-sectional study was carried out; information on knowledge, attitudes and practices with respect to antimalarial drug use for children was obtained using an interviewer administered questionnaire. One hundred and forty four mothers had treated their children for malaria, 43 (29.9%) did not know the cause of malaria, 101 (70.1%) treated their children with ACT (Artemisinin Combination Therapy), 72 (50%) always use a particular method for prevention of malaria and 102 (70.8%) used treated net. Early diagnosis and appropriate treatment of malaria in children requires accessibility, affordability and correct use of antimalarial drugs by mothers in order to prevent emergence of resistant strain.**

**Key words:** Malaria, assessment, children, antimalarial drug use.

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## INTRODUCTION

Malaria is the most important cause of morbidity and mortality in children under five years of age in Africa (Ologe et al., 2007). It accounts for 20% of childhood deaths in Africa and leading cause of mortality in Nigeria where it is holo-endemic (Omole and Onademuren, 2010). An estimated 655 thousand malaria-related deaths of which 86% were children under 5 years of age were reported in 2010 (WHO, 2010). The rapid increase of resistance to most of the available anti-malarial drugs, as well as resistance of vectors to insecticides had led to re-emergence of malaria in many parts of the world (Ridney, 2002).

The prevalence of *Plasmodium falciparum* resistance to conventional antimalarial drugs have been associated with treatment failure, therefore WHO has recommended Artemisinin Combination Therapy (ACTs) as first line therapy for the treatment of uncomplicated malaria (WHO, 2006).

Studies have shown that antimalarial drugs can be obtained from a variety of sources such as government health institutions, mission clinics, local drug vendors, and open markets (Laing, 1990). Over-the-counter sales of antimalarial drugs and their misuse, which are responsible for the development of resistant strains, are common (Bjorkman, 1990) and these are also determinant factor for chloroquine-resistant *P. falciparum* in many Africa countries (Teklehaimanot, 1986).

Women have the responsibility for providing nursing and health care for their children in Africa (Raikes, 1989), also when children need medical care, their first point of contact is their mothers, therefore a thorough understanding of the mother's knowledge, attitudes, and practices with regard to the malaria is important for adequate prevention and treatment of malaria among children (Yeneneh et al., 1993).

Traditionally in Africa, mothers stay at home to take care of their children and they are more likely to seek and use antimalarial treatment and are the principal motivators and participants in household-based preventive actions (Watch Tower and Tract Society of

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Pennsylvania, 2006), therefore the objective of this study is to assess antimalarial drugs use in children and thereby providing information that can be used to improve knowledge and attitude of the mothers towards malaria treatment in children.

## MATERIALS AND METHODS

### Study setting

A descriptive cross sectional survey was carried out in Bingham University Teaching Hospital is a missionary hospital located at Zaria bye pass in Jos North Local Government Area of Plateau State (Builders et al., 2013) between July 2015 and October 2015 to cover the highest peak malaria transmission as previously described in our recent publication (Builders and Okoro, 2016). Ethical approval was sought and obtained from the Ethical Committee of the Department of Health Research and Ethics Committee, Bingham University Teaching Hospital.

### Study participants

A total of 144 mothers from different low to high socio-economic classes consisting of the highly educated, lowly educated and non school educated attending the outpatient clinics of this tertiary hospital were interviewed. Included in the study were mothers who had children below 5 years of age, mothers of children above 5 years of age and women without children were excluded from the study. The interviews were based on the free and informed consent of the study participants.

### Data collection

The tool for data collection was a pre-prepared questionnaire, which was administered to mothers whose children had previous malaria episode and used anti-malarial or drug perceived to be an antimalarial. The questionnaire comprised of questions on socio-demographic characteristics, knowledge and attitude of mothers to malaria and antimalarial drug use for children. The purpose of the study and the confidentiality of the information collected were explained to the interviewees.

### Statistical analysis

The data collected from this study were subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) for windows (version 20.0). Data was summarized using frequency tables, and percentage distributions. Bivariate analysis was done with Kendall test to investigate association at 0.05 and 0.01 levels of significance.

The result showed that 64 (44.4%) of the respondents were between 21 - 30 years of age, 142 (98.6%) were married, 130 (90.3%) had 1 to 5 children, 52 (36.1%) had secondary education and 65 (45.1%) were self-employed. There was a significant correlation between age and number of children at 0.05 levels (Table 1).

Table 2 shows that 85 (59.0%) knew that malaria is caused by a parasite, almost all the mothers 134 (93.0%) measured correct symptoms of malaria, 117 (81.7%) knew malaria is transmitted by mosquito, 20 (13.9%) did not know the complication of malaria and 66 (45.8%) measured that malaria treatment was decided by mothers and fathers. There were significant correlations between level of education and cause of malaria and cause and symptoms of malaria at 0.01 levels, correlation between complication and malaria treatment decision is significant at 0.05 levels.

Majority of the respondent 101(70.1%) administered ACT, 121(84.0%) used oral antimalarial drugs, 49 (34.0%) purchased their drugs from other sources and 68 (47.2%) preferred these sources because of little waiting time. Correlations between treatment of malaria and number of children is significant at 0.05 levels and at 0.01 levels there was a significant correlation between sources of purchase and determinant of the sources as indicated in Table 3.

About half of the respondents 72 (50%) always use a particular method for prevention of malaria, 102 (70.8%) used treated net as specific method of malaria prevention. There was a significant association between particular method of prevention and specific method of prevention (Table 4).

## Discussion

This study has revealed the poor knowledge of mothers about the causes of malaria, since some of them did know that malaria is caused by a parasite, the respondents associated the cause of malaria with bacteria, virus, food and other causative agents. These findings are consistent with other studies carried out in malaria endemic areas in which knowledge on cause of malaria was demonstrated (Builders et al., 2013; Yeneneh et al., 1993).

The significant association of the level of education with cause of malaria confirms the poor knowledge of respondents on the cause of malaria; this was also associated significantly with the symptoms of malaria. There is a need for an urgent public health intervention, which should include educating the mothers on the causes of malaria.

Mothers knowledge of symptom and transmission of malaria were good in this study, they were able to attribute symptoms of malaria to fever, headache, pain vomiting. These findings are similar to studies conducted in malaria endemic areas in which knowledge on

**Table 1.** Demographic data of the respondents.

<b>Variables</b>	<b>Frequency</b>	<b>Percentages</b>	<b>Valid%</b>	<b>Cumulative %</b>
<b>Age group (years)</b>	64	44.4	46.0	46.0
21-30	61	42.4	43.9	89.9
31-40	12	8.3	8.6	98.6
41-50	2	1.4	1.4	100.0
51-60	139	96.5	100.0	
Total	5	3.5		
Missing system	144	100.0		
Total	142	98.6	98.6	98.6
<b>Marital status</b>	2	1.4	1.4	100.0
Married	144	100.0	100.0	
Separated				
Total				
<b>Number of Children</b>	130	90.3	92.9	92.9
1-5	8	5.6	5.7	98.6
6-10	1	0.7	0.7	99.3
3	1	0.7	0.7	100.0
4	140	97.2	100.0	
Total	4	2.8		
Missing system	144	100.0		
Total				
<b>Level of Education</b>	15	10.4	10.8	10.8
Primary	52	36.1	37.4	48.2
Secondary	44	30.6	31.7	79.9
Undergraduate	28	19.5	20.1	100.0
Graduate	5	3.5	100.0	
None	144	100.0		
Total				
<b>Occupation</b>				
Self employed	65	45.1	45.8	45.8
Civil servant	28	19.5	19.6	65.4
Unemployed	49	34.0	34.6	100.0
Total	142	98.6	100.0	
Missing system	2	1.4		
Total	144	100.0		

\*.Correlation is significant at the 0.05 level (2-tailed).

symptoms of malaria was demonstrated (Buabeng et al., 2007; Kachur and Slutsker, 2006).

Almost all the mothers are generally knowledgeable about the complications of malaria such as loss of consciousness, disability, and death. This study contrasts with the first Kenyan study, where 35% thought that malaria did not cause any disability (Watsierah et al., 2011).

The decision for the treatment of malaria is highly significantly associated with complication of malaria; this is further confirmed by involvement of both fathers and mothers deciding about treatment rather than unilateral decisions made by one of the parents. This appears to be contrary to popular belief and previous observations that it is the mother who is responsible for the health of her children (Raikes, 1989; Malik et al., 2006). This research

also conforms to study carried out in Ethiopia, which indicated that interviewees gave responses that they may not actually have meant, but which they thought were the ones expected by the investigators (Yeneneh et al., 1993).

Many of the respondents administered ACT as the first line drug for the treatment of malaria, this is because WHO has recommended Artemisinin Combination Therapy (ACTs) as first line therapy for the treatment of uncomplicated malaria (WHO, 2006), since drug resistance had become a major problem with the emergence of resistance of *P. falciparum* to nearly all used antimalarial drugs (Ridley, 2002).

This is highly demonstrated by significance association of drug treatment of malaria with number of children by respondents, this is further supported by some studies

**Table 2.** Respondent knowledge of malaria.

<b>Variables</b>	<b>Frequency</b>	<b>Percentages</b>	<b>Valid %</b>	<b>Cumulative %</b>
<b>Cause of malaria</b>				
Parasite	85	59.0	66.4	66.4
Bacteria, virus, others	43	29.9	33.6	100.0
Total	128	88.9	100.0	
Missing system	16	11.1		
Total	144	100.0		
<b>Symptoms of malaria</b>				
Fever, Headache, Pain	134	93.0	95.0	95.0
Vomiting, catarrh, others	7	4.9	5.0	100.0
Total	141	97.9	100.0	
Missing system	3	2.1		
Total	144	100.0		
<b>Transmission of malaria</b>				
Mosquitoes	117	81.3	81.7	81.7
Dirty environment	18	12.5	13.3	100.0
Total	135	93.8	100.0	
Missing system	9	6.2		
Total	144	100.0		
<b>Complication of malaria</b>				
Death	34	23.6	27.4	27.4
Serious complications	88	61.1	71.1	98.4
Others	2	1.4	1.6	100.0
Total	124	86.1	100.0	
Missing system	20	13.9		
Total	144	100		
<b>Decision on malaria treatment</b>				
Mother	53	36.8	38.1	38.1
Father	20	13.9	14.4	52.5
Both	66	45.8	47.5	100.0
Total	139	96.5	100.0	
Missing system	5	3.5		
Total	144	100.0		

\*\*Correlation is significant at the 0.01 level (2-tailed).

\*Correlation is significant at the 0.05 level (2-tailed).

which show that mothers are more likely to seek and use antimalarial treatment and are the principal motivators and participants in household-based preventive actions (Raikes, 1989; Malik et al., 2006; Yeneneh et al., 1993). However, the findings in our current study further reveal that despite the change in the National Guidelines for treatment of malaria in Nigeria, Chloroquine and Sulphadoxine/Pyrimethamine were still used by some mothers for treating their children, this study is in agreement with some studies in which Sulphadoxine/Pyrimethamine and CQ were the most frequently purchased anti-malarial drugs in the community (Omole and Onademuren, 2010). Also in order to preserve the efficacy of artemisinins as an essential component of life-saving ACTs, WHO has

called for a ban on the use of oral artemisinin monotherapies at various levels including manufacturers, international drug suppliers, National health authorities and funding agencies involved in the funding of essential antimalarial medicine, therefore artemisinin derivative used as monotherapy is no longer encouraged (Builders et al., 2014 ), interestly, some of the interviewees treat their children with this antimalarial drug.

The antimalarial drugs were administered in oral and parenteral forms with the oral medications dominating; pharmacokinetics and clinical trials indicated that oral forms of drugs are effective as injections, with oral medications more cost effective (Builders and Aguwa, 2012).

Majority of the respondents sourced their drugs from

**Table 3.** Respondents knowledge of treatment of malaria.

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>% Valid</b>	<b>% Cumulative</b>
<b>Antimalarial drugs</b>				
Chloroquine	9	6.3	7.2	7.2
Sulphadoxine/Pyrimethamine	11	7.6	8.8	16.0
Quinine	1	0.7	0.8	16.8
Artemisinin	3	2.1	2.4	19.2
Artemisinin combination therapy	101	70.1	80.8	100.0
Total	121	86.8	100.0	
Missing system	19	13.2		
Total	144.0	100.0		
<b>Mode of administration</b>				
Oral Preparations	121	84.0	89.0	89.0
Parenteral preparations	15	10.4	11.0	100.0
Total	8	5.6	100.0	
Missing system	136	94.4		
Total	8	5.6		
Total	144	100.0		
<b>Sources of drugs</b>				
Traditional practitioner	1	0.7	0.7	0.7
Government clinic	60	41.7	44.4	45.1
Mission clinic	26	18.1	19.3	64.4
Local drug shop	46	31.9	34.1	98.5
Others	2	1.4	1.5	100.0
Total	9	6.3	100.0	
Missing system	135	94.8		
Total	9	5.3		
Total	144	100.0		
<b>factor(s) influencing particular sources of treatment</b>				
Close to home	22	15.3	17.9	17.9
Treatment is cheap	2	1.4	1.6	19.5
Treatment is effective	68	47.2	55.3	74.8
There is little waiting time	5	3.5	4.1	78.9
Others	26	18.1	21.1	100.0
Total	123	85.4	100.0	
Missing system	21	14.6		
Total	144	100.0		

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

traditional practitioners, local drug shops, friends, relatives and left over. Accessing care from a variety of sources is a common practice in malaria endemic areas (Malik et al., 2006), this study is similar studies conducted in Nigeria, Philippine and Uganda (Espino and Mandelson, 2000; Nuwaha, 2002). The determinant of these sources is effective treatment; this is also in agreement with some studies (Yeneneh et al., 1993; Kloos et al., 1987). The correlation between the sources of antimalarial drug and the determinant factors is therefore significant.

Prevention of resistant falciparum malaria requires the rational use of antimalarial as well as the intensification of

vector control, such as source reduction through destruction of mosquito breeding sites, and avoidance of man-vector contact by using protective measures, e.g., bed nets and repellents (Goriup, 1989). This can be achieved by the combined individual and community participation (Builders et al., 2013), and can be used in developing broader-based control strategies (Ruebush et al., 1992). Treated net is the most specific method of malaria prevention by many mothers, this is highly dependent on frequency of malaria prevention, and also these methods for prevention of malaria in children are similar to those used in many studies (Ruebush et al., 1992).

**Table 4.** Prevention of malaria.

Variables	Frequency	Percentage	% Valid	% Cumulative
<b>Frequency of prevention</b>				
Sometimes	53	36.8	42.4	42.4
Always	72	50.0	57.6	100.0
Total	125	86.8	100.0	
Missing system	19	13.2		
Total	144	100.0		
<b>Specific method of prevention</b>				
Chemoprophylaxis	4	2.8	2.9	2.9
Staying indoors at dusk	4	2.8	2.9	5.7
Treated net	102	70.8	72.9	78.6
Insecticides	18	12.5	12.8	91.4
Others	12	8.3	8.6	100.0
Total	140	97.2	100.0	
Missing system	4	2.8		
Total	144	100.0		

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Conclusion

This study has shown that mothers demonstrated good knowledge of symptoms, transmission, complication and prevention of malaria, however, knowledge about the cause of malaria is poor, there is a need for an urgent public health intervention, which should include educating the mothers on the causes of malaria, importance of adherence to Artemisinin Combination Therapy (ACT) as first line treatment for uncomplicated malaria to lessen the use of less efficacious anti-malarial and reduce the emergence and spread of drug-resistant malaria.

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