

## COMMON ANTI-MALARIAL DRUG PRESCRIPTION AND PATIENT AFFORDABILITY IN SOKOTO NIGERIA

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### ABSTRACT

**Objective:** This study aimed at accessing the pattern of antimalarial prescription against current WHO recommendation and patient affordability of the prescribed antimalarial drug.

**Methods:** This study recruited outpatients that were prescribed antimalarial drug for uncomplicated malaria in the normal course of medical practice in health centers within Sokoto Metropolis, and a total of two hundred structured questionnaires were issued on patient's socioeconomic and demographic background, as well as methods of malaria diagnosis and treatment pattern. Data was analyzed using SPSS statistic version 20 (SPSS Inc. Chigao, USA).

**Results:** Artemisinin-based combination therapy is the major (75.0%) antimalarial prescribed, followed by mono therapy (19.5%) and 81.5% of the patients belong to middle socioeconomic class, and 12.5% lower class. However, 25.5% could not afford the antimalarial drugs, out of which 88.2% were ACTs. Conversely, unaffordability is higher (82.4%) among middle class followed by lower socioeconomic class (15.7%), of which females constituting 30.0% of the lower class. Most of the diagnoses were presumptive (56.5%), while laboratory or parasitological diagnosis was made in 43.5% of the patients. Conclusion: This study concludes that over a quarter of respondent could not afford antimalarial medications, with more than one half of the malaria diagnosis been presumptive. Therefore, there is the need to emphasize adherence to current WHO recommendation of confirmation of all cases of malaria by a laboratory test before treatment so as to reduce misuse of antimalarial drugs, as well as resistance, and also reduced socioeconomic pressure on the patient and family.

**Keywords:** Affordability, Malaria treatment, Diagnostic method, Sokoto-Nigeria

### INTRODUCTION

Malaria is still a global health problem for more than 125 years after the discovery of plasmodium species as the sole cause of malaria [1]. Since 2008; Nigeria has changed its treatment guidelines for management of malaria and now uses artemisinin-base combination therapy (ACT) in treating uncomplicated malaria and Quinine for management of acute or complicated malaria [2]. However, malaria has been the commonest reason most individuals become ill in Nigeria, and contemporary figures suggest that at least one-half of the estimated 160 million people living in the country will have one or more malaria attack annually [3]. Sadly the increasing resistance of plasmodium falciparum to widely available and affordable anti malaria drugs is making the treatment of this condition difficult. However, artemisinin-containing combination therapies are said to be expensive, costing far more than chloroquine and sulphadoxin-pyrimethamine (SP) combined,  $\beta$ -cyclodextrin boost antimalarial activity of pyrimethamine by increase its solubility [4, 5]. The latest World Health Organization (WHO) guidelines on the treatment of malaria states that, whenever possible, in all settings, clinical suspicion of malaria should be confirmed with a parasitological diagnosis [6, 7]. This is a significant change from the previous guidelines [8], which recognized that parasitological diagnosis is not always necessary, especially in high transmission areas. In all malaria endemic countries, in Africa, 25–40% (average 30%) of all outpatient clinic visits is for malaria (with most diagnosis made clinically). In these same countries, between 20% and 50% of all hospital admissions are a consequence of malaria with high case-fatality rates due to late presentation, inadequate management, and unavailability or stock-outs of essential drugs, malaria is also a leading contributor to deaths among hospital inpatients [9, 10].

### MATERIALS AND METHODS

#### Study Area

This research area comprise of three local government areas of Sokoto state, Nigeria, which are Sokoto North Local Government Area, Sokoto South Local Government Area, Wamakko Local

Government Area and DangeShuni Local Government Area representing Metropolitan area, in the state. Sokoto State was created on 3rd February 1976 with an area of 25,973 square kilometers and an estimated population of 4,244,399 (2005 pop census). It has 23 local government areas and its bordered northwards by Niger Republic, westwards by Kebbi State and Benin Republic and eastwards by Zamfara State. The state is populated by Hausa and Fulani tribes who usually engage in subsistence farming and cattle rearing. Sokoto State is in the arid Sahel surrounded by sandy savannah and isolated hills with an annual average temperature can reach 28.3 degrees Celsius, the warmest months are from February to April when temperature can be as high as 40 degrees Celsius while the dry cold, harmattan starts from October to February ([www.sokoto.com](http://www.sokoto.com)).

#### Study Population

The study population consists of outpatients that were prescribed antimalarial drug for uncomplicated malaria in the normal course of medical practice in health centers within Sokoto Metropolis.

#### Study design

A cross-sectional descriptive study involving patient diagnosed of having uncomplicated malaria and have antimalarial drug prescribed.

#### Data collection

A total of two hundred structured questionnaires were issued on patient's socio-economic and demographic background, as well as methods of malaria diagnosis and treatment pattern. The socioeconomic status was assessed by using the Modified Kuppusswamy's scale of socio-economic status classification, using occupation, education and per capita income as parameters [11].

#### Ethical consideration

Ethical approval carry out this study was obtained from Specialist Hospital Sokoto. Informed consent was also obtained from the

selected subjects; the purpose of the study was explained to them, and their contribution were treated confidentially (Helsinki Declaration).

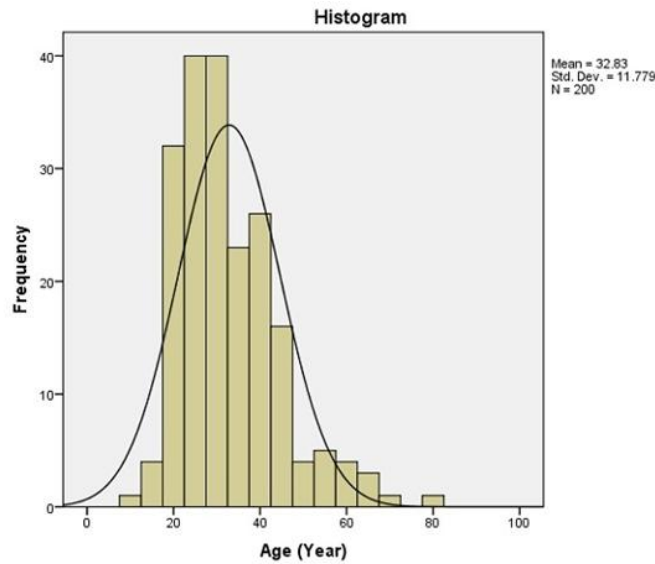
**Data analysis**

In this analysis, we considered diagnosis and treatment of malaria based on presumptive or laboratory diagnosis, types of antimalarial prescribed. Patient socioeconomic status and antimalarial affordability and the data were analyzed using SPSS statistic version 20.

**RESULTS**

**Socio-demographic data**

In this study, 200 subjects of which 119(59.5%) were males and 81(40.5%) were Females, with a mean age distribution of 32.83(SD 11.78) as seen in the figure below. However, 163(81.5%) of the patients belongs to middle socioeconomic class and 25(12.5%) to Lower class while only 12(6.0%) belongs to upper socioeconomic class.



**Fig. 1: Show age distribution of the study population.**

**Treatment pattern**

Artemisinin-based combination therapy is the leading 150(75.0%) antimalarial prescribed, and are mainly artemether-lumefantrine combination, followed by mono therapy 39(19.5%) which Consisting chloroquine, sulfadoxine pyrimethamine, and artesunate been used alone, however, non-ACTs constituting 11(5.5%) which include sulfadoxine pyrimethamine with chloroquine (SP+CQ) or amodiaquine (SP+AQ).

**Affordability**

Majority 149(74.5%) were able to purchase the antimalarial drugs prescribed, while 51(25.5%) could not afford the medication, out of which 45(88.2%) were ACTs, with only 3(5.9%) each of non-ACTs and monotherapy. However, unaffordability is higher 42(82.4%), among middle socioeconomic class, and 8(15.7%) lower socioeconomic class with females constituting 6(30.0%) of the lower class, details in table below.

**Table 1: Show patient affordability, Socio Economic Class and Gender Distribution.**

Gender			Socio Economic Class			Total	
			Upper Class	Middle Class	Lower Class		
Male	Affordability	yes	Count	6 <sub>a</sub>	74 <sub>a</sub>	8 <sub>a</sub>	88
		% within Affordability	6.8%	84.1%	9.1%	100.0%	
	no	Count	0 <sub>a</sub>	29 <sub>a</sub>	2 <sub>a</sub>	31	
		% within Affordability	0.0%	93.5%	6.5%	100.0%	
	Total		Count	6	103	10	119
			% within Affordability	5.0%	86.6%	8.4%	100.0%
female	Affordability	yes	Count	5 <sub>a</sub>	47 <sub>a</sub>	9 <sub>a</sub>	61
		% within Affordability	8.2%	77.0%	14.8%	100.0%	
	no	Count	1 <sub>a</sub>	13 <sub>a</sub>	6 <sub>a</sub>	20	
		% within Affordability	5.0%	65.0%	30.0%	100.0%	
	Total		Count	6	60	15	81
			% within Affordability	7.4%	74.1%	18.5%	100.0%
Total	Affordability	yes	Count	11 <sub>a</sub>	121 <sub>a</sub>	17 <sub>a</sub>	149
		% within Affordability	7.4%	81.2%	11.4%	100.0%	
	no	Count	1 <sub>a</sub>	42 <sub>a</sub>	8 <sub>a</sub>	51	
		% within Affordability	2.0%	82.4%	15.7%	100.0%	
	Total		Count	12	163	25	200
			% within Affordability	6.0%	81.5%	12.5%	100.0%

Each subscript letter denotes a subset of Socio Economic Class categories whose column proportions do not differ significantly from each other at the .05 level.

## Diagnostic methods

Most of the diagnosis was made presumptively 113(56.5%) while laboratory or parasitological diagnosis was made in 87(43.5%) of the patients.

## DISCUSSION

Low socioeconomic class is at increased risk of becoming infected with malaria and been infected more often. Similarly, infant mortality rates are known to be higher in low socioeconomic households, and malaria is responsible for a considerable proportion of these deaths. In a demographic surveillance system, in rural areas of the United Republic of Tanzania, under-5 mortality following acute fever (much of which would be expected to be due to malaria) was 39% higher in the poorest socioeconomic status than in the richest [12]. However, in this study, malaria was found to be higher in middle (81.5%) and lower (12.5%) socio-economic Class. The effect of combination therapy is enhanced by inclusion of an artemisinin derivative. Artemisinin antimalarial decrease parasite density more rapidly than other antimalarial drugs [13]. When used alone, the short half-life of the artemisinin derivatives minimizes the period of parasite exposure to sub therapeutic blood levels. In combination with another drug with a longer half-life, the short half-life and rapid parasite clearance time of artemisinin derivatives suggest that many fewer parasites are exposed to the companion drug alone after elimination of the artemisinin component. These characteristics reduce the likelihood that a resistant mutant will survive therapy and may also reduce overall malaria transmission rates. However, this study show that, artemisinin-based combination therapy is the major (75.0%) antimalarial prescribed for the treatment of uncomplicated malaria, which is similar to study conducted in Ghana, of which most prescribed antimalarial drugs for the management of uncomplicated and complicated malaria were found to be amodiaquine plus artesunate (90.5%) and quinine (99.03%) respectively[14]. Result of this study concurs with recommended policies in other countries [14]. Cambodia was the first country to change it national antimalarial drug policy to an ACTs of artesunate and mefloquine [15]. In Kenya SP was adopted as first line therapeutic for uncomplicated malaria and was changed to artemether-lumefantrine as the recommended first line therapy [16]. 90.5 % of the antimalarial drug prescribed for the management of uncomplicated malaria was artesunate plus amodiaquine, 6.8% for artemether plus lumefantrine and then 2.7% for artesunate. However, In January 25, 2005, Nigeria changed its antimalarial drug policy from the use of chloroquine to combination therapy of; artemether plus lumefantrine and artesunate plus amodiaquine [17] for the management of uncomplicated malaria and also recommended artesunate Injection and injection quinine for the management of severe malaria. The diagnosis of malaria has conventionally relied on the clinical symptoms of malaria [18, 19] and microscopic examination of Giemsa stained blood films. Diagnosis based on symptoms alone is questionable because symptoms of malaria are non-specific, and overlapping with other febrile illnesses [20]. Studies in Africa have revealed that more than 50% of patients clinically diagnosed with malaria have illnesses attributable to some other causes [21-23]. In Niger, the clinical diagnosis of malaria is based essentially on the presence of fever, defined as an axillary temperature of at least 37.5°C [24]. However, even during the period in which malaria transmission rates were high, diagnosis on the basis of temperature seemed to have low sensitivity and specificity (32.5%), therefore, the survey showed that the number of cases of presumed malaria reported in health centers, in Niger, is largely over estimated, with almost half the patients treated for malaria during the rainy season not carrying parasites [24]. According to W H O, presumptive diagnosis is a common practice throughout Africa. Almost 80% of African countries confirm no more than 10% of infections, whereas more than half the cases, if not more, reported in Asia are confirmed [25]. In this study, presumptive diagnosis (56.5%) takes precedence over laboratory confirmed diagnosis (43.5%). However, it is clear that the use of presumptive diagnosis in Sokoto does not provide a sufficiently accurate estimate of malaria incidence, most especially with the increase in

the number of consultations as a result of free maternal and child care proclamation of the State Government. Conversely, WHO currently recommends the confirmation of all cases of malaria by a biological test before commencing treatment [26]

## CONCLUSION

In conclusion, over a quarter of respondent could not afford antimalarial medications, with more than one half of the malaria diagnosis been presumptive. However, the treatment of choice for uncomplicated falciparum malaria is a combination of two or more antimalarial with different mechanisms of action. Likewise, the main antimalarial prescribed in this study was artemether-lumefantrine combination (75.0%). This show level of adherence by the prescribers to the antimalarial drug policy was high. However, presumptive diagnosis (56.5%) takes precedence over laboratory confirmed diagnosis (43.5%). Therefore, there is the need to emphasize adherence to current WHO recommendation of confirmation of all cases of malaria by a biological test before treatment.

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