

# Awareness of the National Antimalarial Treatment Policy and Malaria Self-care Practices among Medical Students and the Staff of the University of Calabar, Nigeria

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DOI: [10.36348/sjpm.2019.v04i11.005](https://doi.org/10.36348/sjpm.2019.v04i11.005)

| Received: 13.10.2019 | Accepted: 20.10.2019 | Published: 18.11.2019

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## Abstract

**Introduction:** The efforts towards elimination of malaria in Nigeria is being anchored based on a policy document - the National Antimalarial Treatment Policy (NATP). This study is to assess awareness of the NATP and the level of practice of malaria self-care among medical students and the University staffs working in the Medical college/Teaching hospital.

**Material and Method:** A descriptive study that took place at the University of Calabar Teaching Hospital, Calabar involving medical students and members of the staff of the University working in the laboratories. Information was obtained from the participants through administration of structured questionnaire. **Results:** One hundred and thirty two (65%) were aware of the existence of national antimalarial treatment policy. One hundred and fifty two (73%) of the participants practiced malaria self-care. The association between gender and awareness of antimalarial treatment policy was statistically significant (p-value = 0.020;  $X^2 = 5.46$ ). The odds of being aware of antimalarial treatment policy was increased by a factor of 1.873 being a male rather than being a female (p-value = 0.61). Participants of younger age (age group 17–25) were more likely to visit Chemist shop to purchase antimalarial drug for self-medication than older participants. **Conclusion:** The level of awareness of the national antimalarial treatment policy was considerably high among the participants with an attendant high level of malaria self-care practices. There is room to improve on the level of awareness and to dissuade young people from practicing self-medication

**Keywords:** Malaria, malaria self-care, antimalarial treatment policy, malaria treatment guidelines.

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## BACKGROUND

Malaria has remained a major public health menace in Nigeria. The health and economic impact of malaria in Nigeria is huge. In Nigeria, malaria is endemic and the transmission of malaria occurs all year-round. The entire Nigerian population of about 190 886 313 is at risk of malaria – the 25% of global burden of malaria is contributed by Nigeria [1]. Thirty percent of childhood mortality and 11% of maternal mortality is reported to result from malaria, in effect, significantly contributing to the loss of one million lives globally, most of whom being children and pregnant women [2].

In 2005, Nigeria came up with a major update of the national antimalarial drug policy. The policy change was in line with the World Health Organization's (WHO) recommendation of the use of artemisinin-based combination therapies (ACT) in countries where *P. falciparum* malaria is resistant to

chloroquine, sulfadoxine-pyrimethamine and amodiaquine [3]. Nigerian Federal ministry of Health (FMOH) in 2005 adopted the antimalarial drug treatment policy (NATP) and the national antimalarial treatment guideline (NATG) in conjunction with the National Malaria and Vector Control Division [4, 5]. The overarching aims of both NATP and NATG are to reduce morbidity, reduce malaria morbidity by halting the progression of uncomplicated disease into severe and potentially fatal disease, introduce effective intermittent preventive treatment and reduce the development of antimalarial drug resistance. The WHO has been in the vanguard of directing and streamlining the development of antimalarial treatment guidelines based on the latest best available evidences in malaria research. The core principles guiding the development of *WHO Guidelines for the treatment of malaria* include: early diagnosis and prompt, effective treatment of malaria, rational use of antimalarial agents, combination therapy, and appropriate weight-based

dosing [6]. Among other objectives, the guidelines assist policy-makers to design and refine effective national treatment policies on the basis of the best available evidence.

Fourteen years since Nigeria adopted NATP and NATG as part of her efforts in the control/elimination of malaria, a lot has happened. The ACTs still remain the most efficacious antimalarial drugs for malaria treatment. In 2009 – 2010, the National Drug Therapeutic Efficacy Tests (DTET) conducted demonstrated efficacy of the recommended ACTs [7]. The strategic plan currently is no longer just malaria control, but rather, efforts are being made to eliminate malaria from Nigeria, as such, the National malaria program has been rechristened National Malaria Elimination Program (NMEP) from what it used to be known – National Malaria Control Program. The activities of the NMEP are guided by the National Malaria Strategic Plans and the core goal of the Strategic Plan (2014–2020) is to achieve pre-elimination status and reduce malaria related deaths to zero by 2020 pursuing seven strategic objectives [2]. The fight against malaria, no doubt has yielded positive results. There has been demonstrable downward trend of indices such as malaria cases and mortality rates. The downward trend seems to have been arrested, indicating that global efforts against malaria is no longer yielding gains [8]. For instance, there were 2019 million cases of malaria in 2017 compared to 2017 million the previous year, with Nigeria registering a 1.3 million increases in cases in 2017 [1].

It is obvious we need to be reflective in approach to check if there is something we are not doing right. Knowledge of NATP/NATG and adherence to the guidelines make a good start in the fight against malaria. We should not pretend or assume that every malaria case treatment in Nigeria is given by a trained care giver, e.g., a physician. The fact is that self-medication in the developing countries is a common practice [9, 10]. Several studies within Nigeria and outside of Nigeria have reported self-medication practices with antimalarial drugs among adults and students, but few have tried to assess the level of awareness of the national antimalarial treatment policy/guidelines [11-13]. Self-medication of drugs is fraught with drawbacks, however, if well practiced, builds confidence in the patient to manage his/her own health, saves time spent waiting for the healthcare giver and also can reduce healthcare costs [14-16]. Safe self-medication of antimalarial drug must be based on the national malaria treatment policy and guidelines. This study therefore aimed to assess the awareness of antimalarial treatment policy and malaria treatment practices among medical students and staff of the University of Calabar/Teaching Hospital who work in the laboratories where the students are doing postings.

## **MATERIALS AND METHODS**

### **Study Design and Setting**

A descriptive cross-sectional study was carried out in University of Calabar/Teaching Hospital located in Calabar south Local Government Area of Cross River State, Nigeria. The study took place between September to November, 2018.

### **Study Participants**

Participants included in the study were 4<sup>th</sup>-year Medical students, and Medical Laboratory science students undergoing posting in the four laboratories – Chemical pathology, Hematology, Medical Microbiology and Parasitology and Anatomic Pathology. Also, the staff of the University of Calabar and/or University of Calabar Teaching Hospital training or assisting in their training at the time of the study were included.

### **Ethical Considerations**

This study received approval from the University of Calabar Teaching Hospital Health Research and Ethics Committee (UCTH/HREC/33/324). Consent was sought and obtained from the participants. We excluded any participants who declined consent. Data was adequately de-identified to prevent personal identity from being revealed (preserving privacy for study participants). This was done by deleting personal identifiers e.g., names.

### **Sample Size**

The total sample size was 214. The calculated sample size was 114 based on the formula  $N = (Z)^2 p(1-p)/e^2$  [17]. We assumed that the University of Calabar students constitute 9% of the total Calabar City population of between 250 – 499,000 [18]. We added 100 participants to make it up to 214 to make the data robust.

### **Data Collection**

#### **Data Collection Technique**

A convenient sampling method was used to recruit all the participants. A pretested structured questionnaire was used to obtain information from the participants. The information obtained included demographic characteristics (age, sex, and profession), knowledge of the national antimalarial treatment policy, knowledge of ban or shift from monotherapies to artemisinin-based combination therapy, participants' malaria treatment practices, etc.

### **Data Analysis**

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 (SPSS INC, Chicago, IL, USA). Quantitative variables were analyzed using appropriate summary statistics (mean, standard deviation). Categorical variables were presented using frequencies and proportions. Associations between two categorical variables were

assessed using Pearson’s Chi-square test. Multivariate logistic regression, employing two or more independent variables was used to predict the dependent variables (Awareness of ACT treatment policy, malaria self-care practices). P-values < 0.05 were considered significant for all analyses.

**RESULTS**

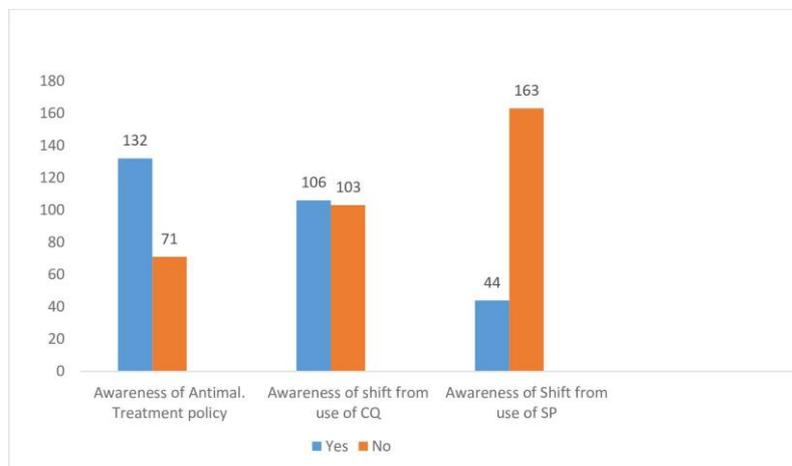
This study recruited 214 participants, however two (2) were excluded due to incomplete data. The age of the participants ranged from 17 to 64 years with a mean of 25.5(±7.9). There were 93 (44.7%) males and 115 (55.3%) females, giving a male: female ratio of 1.6:2. Seventy five (35.7%) were either staff of the University of Calabar or University of Calabar Teaching Hospital, while 135 (64.3%) University of Calabar Medical/Para-medical students (Table-1).

**Table-1: Demographic Characteristics of the Respondents**

Characteristics	% Frequency/Mean (SD)	Total
Age group (years)		
17-25	67.4	126
Above 25	32.6	61
Total	100	187
Age continuous: Mean (SD)	25.49 (±7.9)	
Sex		
Male	44.7	93
Female	55.3	115
Total	100	208
Profession		
Hospital/University Staff	35.7	75
Students	64.3	135
Total	100	210
Is there a ban on the Use of CQ?		
Yes	50.7	106
No	49.3	103
Total	100	209
Is there a ban on the use of SP?		
Yes	21.3	44
No	78.7	163
Total	100	207
Knowledge of antimalarial treatment policy/guideline		
Yes	65.0	132
No	35.0	71
Total	100	203
Confidence about antimalarial drug to buy/use		
Yes	81.3	169
No	18.8	39
Total	100	208

One hundred and thirty two (65%) were aware of the existence of national antimalarial treatment policy/guidelines, 106 (50.7%), and 44 (21. %) knew

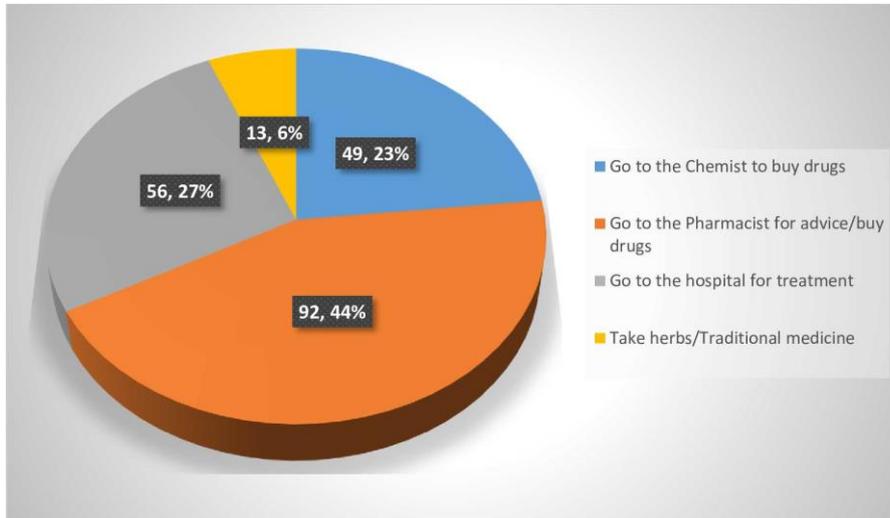
there has been a ban on the use chloroquine (CQ) and sulfadoxine-pyrimethamine (SP) respectively for the treatment of malaria in Nigeria (Fig-1).



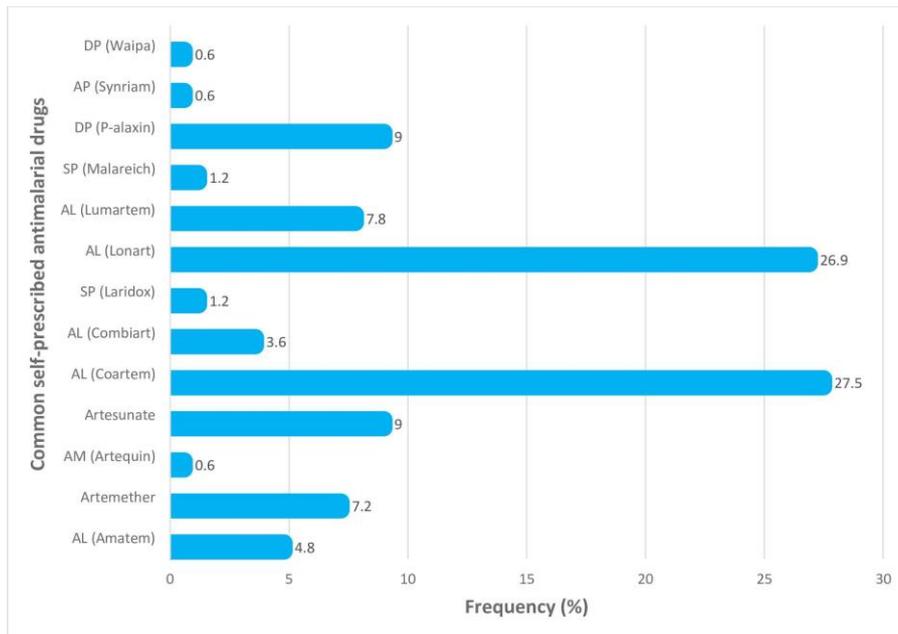
**Fig-1: Awareness of the national antimalarial treatment policy and ban of monotherapies**

About what people do when they suspect they have malaria, the distribution of the participants responses were displayed in a pie chart in Fig-2. One hundred and fifty two (73%) of the participants practiced malaria self-care, while only 55 (27%) of them observed appropriate case-based management which involves treatment for malaria only after patient is tested and diagnosed of having malaria. It was

observed that the most common antimalarial drug taken by the participants was Artemether/Lumefantrine, sold in different non-proprietary names as Amatem, coartem, combiart, lonart, and lumartem, while the least used were Arterolane/Piperaquine (Synrian), and Artesunate/Mefloquine (Artequin) each taken by 1 participant (0.6%) (Fig-3).



**Fig-2: What participants do when they suspect they have malaria?**



**Fig-3: Common self-prescribed antimalarial drugs taken by the participants**

Keys: DP = Dihydroartemisinin/Piperaquine; AP = Arterolane/Piperaquine; SP = Sulfadoxine/Pyrimethamine; AL = Artemether/Lumefantrine; AM = Artesunate/Mefloquine

There was statistically significant association between the respondents’ educational status and the confidence they display in practicing self-medication of antimalarial drug. Most of the students and the staff of the University and the Teaching Hospital who had tertiary education (84.8%) claimed they knew what

drug and how to treat malaria (p-value = 0.024;  $X^2 = 5.11$ ). Also, the association between knowledge of the ban placed on the use of Sulfadoxine-Pyrimethamine (SP) monotherapy and educational status was statistically significant (p-value = 0.04;  $X^2 = 3.88$ ) (Table-2).

**Table-2: Respondents’ knowledge of ACT Policy and malaria self-care practices based on their Educational status**

Parameters	Secondary N (%)	Tertiary N (%)	p-value	X <sup>2</sup>	Total
Confidence about antimalarial drug to buy/use			0.024	5.11	
Yes	33 (70.2)	134 (84.8)			167
No	14 (29.8)	24 (15.2)			38
Awareness of ACT policy			0.669	0.183	
Yes	29 (63.0)	103 (66.5)			132
No	17 (37.0)	52 (33.5)			69
What do you do when you feel like you have malaria?			0.483	2.457	
Go to Chemist	10 (20.4)	39 (24.7)			49
Go to the Pharmacist	21 (42.9)	70 (44.3)			91
Go to Hospital	13 (26.5)	42 (26.6)			55
Take traditional medicine	5 (10.2)	7 (4.4)			12
Is there a ban on the Use of CQ?			0.624	0.240	
Yes	23 (46.9)	81 (50.9)			104
No	26 (53.1)	78 (49.1)			104
Is there a ban on the Use of SP?			0.040	3.882	
Yes	5 (10.6)	38 (23.9)			43
No	42 (89.4)	121 (76.1)			163

Table-3 shows the relationship between the participants’ knowledge about antimalarial treatment policy, malaria self-care practices and their profession,

being a medical student or a University or Teaching Hospital staff. There was no statistically significant association.

**Table-3: Respondents’ knowledge of ACT Policy and malaria self-care practices based on their professions**

Parameters	Students N (%)	Univ/Hospital Staff N (%)	p-value	X <sup>2</sup>	Total
Confidence about antimalarial drug to buy/use			0.294	1.100	
Yes	105 (78.9)	62 (84.9)			167
No	28 (21.1)	11 (15.1)			39
Awareness of ACT policy			0.050	0.183	
Yes	79 (60.3)	53 (73.6)			132
No	52 (39.7)	19 (26.4)			71
What do you do when you feel like you have malaria?			0.607	1.835	
Go to Chemist	34 (25.2)	15 (20.5)			49
Go to the Pharmacist	55 (40.7)	35 (47.9)			90
Go to Hospital	36 (26.5)	20 (27.4)			56
Take traditional medicine	10 (7.4)	3 (4.1)			13
Is there a ban on the Use of CQ?			0.196	1.672	
Yes	64 (47.4)	42 (56.8)			106
No	71 (52.6)	32 (43.2)			103
Is there a ban on the Use of SP?			0.280	1.168	
Yes	25 (18.9)	19 (25.3)			44
No	107 (81.1)	56 (74.7)			163

The bivariate analysis of the respondents’ knowledge of antimalarial treatment policy and malaria self-care practices based on respondents’ gender is

shown in Table-4. The association between gender and awareness of antimalarial treatment policy was statistically significant (p-value = 0.020; X<sup>2</sup> = 5.46).

**Table-4: Respondents’ knowledge of ACT Policy and self-care malaria practices based on their gender**

Parameters	Male N (%)	Female N (%)	p-value	X <sup>2</sup>	Total
Confidence about antimalarial drug to buy/use			0.257	1.286	
Yes	78 (84.8)	88 (78.6)			166
No	14 (15.2)	24 (21.4)			38
Awareness of ACT policy			0.020	5.462	
Yes	67 (73.6)	63 (57.8)			130
No	24 (26.4)	46 (42.2)			70
What do you do when you feel like you have malaria?			0.266	3.958	
Go to Chemist	28 (30.1)	21 (18.6)			49
Go to the Pharmacist	36 (38.7)	54 (47.8)			90
Go to Hospital	23 (24.7)	31 (27.4)			54
Take traditional medicine	6 (6.5)	7 (6.2)			13
Is there a ban on the Use of CQ?			0.852	0.350	
Yes	46 (50.0)	59 (51.3)			106
No	46 (50.0)	56 (48.7)			102
Is there a ban on the Use of SP?			0.10	2.608	
Yes	23 (25.0)	18 (15.9)			41
No	69 (75.0)	95 (84.1)			164

Table-5 shows the association between predictor variables and awareness of national antimalarial treatment policy. It provides the odds ratio and 95% confidence intervals to quantify the association. There were no statistically significant association. Table-6 is a similar table showing the association between the predictor variables and malaria self-care practices. The analyses were obtained using multivariate logistic regression models. Table 5 shows that the odds of being aware of antimalarial treatment

policy was increased by a factor of 1.873 being a male rather than being a female (p-value = 0.61), the odds decreases by a factor 0.647 being a medical/para-medical student rather than being a University or Teaching Hospital staff. Table 6 shows that being younger (age group 17 – 25) has much greater odds of visiting Chemist shop to purchase antimalarial drug for self-medication than for older participants. This association was statistically significant (p-value = 0.033; OR = 4.801).

**Table-5: Predictor variables for awareness of ACT Malaria treatment policy**

Predictors	Odds ratio	Confidence interval	p-value
Gender Male Female (ref)	1.873	0.971 – 3.614	0.61
Profession Student Univ/Hospital Staff (ref)	0.647 (-)	0.317 – 1.319	0.231
Age (Years) 17 – 25 >25 (ref)	0.966 (-)	0.473 – 1.971	0.924
Education Secondary Tertiary	0.969 (-)	0.463 – 2.031	0.934

**Table-6: Predictor variables for malaria self-care practices**

Predictors	Odds ratio	Confidence interval	p-value
<b>Go to the Chemist</b>			
Gender Male Female (ref)	1.206	0.304 – 4.788	0.61
Profession Student Univ/Hospital Staff (ref)	0.414 (-)	0.71 – 2.403	0.326
Age (Years) 17 – 25 >25 (ref)	4.801	1.137 – 20.266	0.033
Education Secondary Tertiary (ref)	0.243 (-)	0.056 – 1.059	0.06
<b>Go to the Pharmacist</b>			
Gender Male Female (ref)	0.466 (-)	0.125 – 1.1741	0.256
Profession Student Univ/Hospital Staff (ref)	0.210 (-)	0.039 – 1.123	0.068
Age (Years) 17 – 25 >25 (ref)	2.665	0.699 – 10.164	0.151
Education Secondary Tertiary (ref)	0.358	0.092 – 1.386	0.137
<b>Go to the Hospital</b>			
Gender Male Female (ref)	0.612	0.157 – 2.379	0.478
Profession Student Univ/Hospital Staff (ref)	0.295	0.053 – 1.656	0.165
Age (Years) 17 – 25 >25 (ref)	3.631	0.895 – 14.724	0.071
Education Secondary Tertiary (ref)	0.375	0.092 – 1.526	0.171

## DISCUSSION

Chemotherapy remains a consistent strategy employed by many Nigerians for the control of malaria [4]. Self-medication with antimalarial drugs for malaria treatment is commonly practiced among students and staff of tertiary institutions [9, 10]. It is a known fact that self-medication of any kind is associated with adverse outcomes such as adverse drug reactions, inadequate dosing, drug interactions, emergence and spread of drug resistance [19]. However, on the positive side, with a good knowledge of-, and strict adherence to NATP, uncomplicated malaria can be safely treated. It can also be very helpful in areas where health manpower is inadequate. So, this study was carried out

to assess awareness of NATP and/or NATG among medical/para-medical students and the members of the staff teaching and aiding in their teaching, 14 years after policy change.

This study reveals that awareness of existence of NATP was fairly high among the respondents. This was similar to the findings by RA Momodu in his thesis [20]. Two other similar studies conducted among physicians in Delta and Oyo States of Nigeria, recorded much higher awareness rate (over 90%) [21, 22]. Of other variables tested, only gender demonstrated a significant association with awareness of the NATP. Males' level of awareness was more than their female

counterparts. Adequate knowledge of NATP is important as it will influence behavioral attitude regarding correct dosing, compliance, and appropriate use of available antimalarial drugs [23]. In fact, knowing the provisions of the NATP and adhering to the same will regulate the practice of self-medication for malaria in Nigeria. This will underpin the fight against malaria and reduce the development and spread of antimalarial drug resistance.

Federal Government of Nigeria banned the use of inefficacious antimalarial drugs such as chloroquine, sulfadoxine-pyrimethamine, and all oral artemisinin monotherapies in order to promote the use of ACT which till date, remains the best antimalarial medicine for the treatment of uncomplicated malaria [7]. Actually, the ban was ordered to preserve the efficacy of artemisinin as an essential component of life-saving ACTs. The ban on the use of oral artemisinin monotherapies has various targets including drug manufacturers, international drug suppliers, national health authorities and global funders of antimalarial medicines [24, 25]. Whereas about half of the respondents (50%) are aware of the ban on the use of chloroquine, only 21% of the respondents are aware of the ban on sulfadoxine-pyrimethamine. The low level of awareness about the ban on the use of SP for the treatment of uncomplicated malaria could be the reason while some respondents were still using SP to treat malaria. Our result also shows that fairly good number of the respondents still employed the use of oral artemisinin-derivative monotherapy in treating malaria. Interestingly, no respondent used CQ to treat malaria. Reason for this observation could be due to the fact that most chemist and pharmacy stores in Calabar have withdrawn CQ from their counters, while that is not the same for SP.

In Nigeria, Artemether-Lumefantrine (AL) is the treatment of choice while Artesunate-Amodiaquine (AA) is the alternate medicine for the treatment of uncomplicated malaria [7]. This study reveals that over 70% of the respondents claimed to treat malaria with AL, marketed with different branded names such as Amatem, Coartem, Combiart, Lonart, and Lumartem. P-alaxin, an ACT, though not recommended by the 2015-NATG, based on 2009-2010 Drug Therapeutic Efficacy Tests (DTET), was still used by a considerable number of respondents. We inferred that possibly, p-alaxin might have been found closely as effective as AL or AA or it might be relatively less in cost compared to AL/AA. There have been similar findings elsewhere previously [26-28].

Several factors may underlie the reasons for the gaps between policy and practice or what self-care people resort to when they suspect they have malaria. Until recently, such reasons as stock-outs of ACTs, high costs of ACTs, erroneous perception that ACTs are not as effective as CQ or SP, cumbersome dosage

regimen, beliefs that herbal medicines are more effective than the available antimalarial drugs have been prevalent [22, 24, 29, 30]. High proportion of the respondents (94%) treated their suspected malaria illness by recourse to orthodox medicines – either by going to buy their drugs from the chemist shops, or from the pharmacy stores, while others out rightly would go to the hospital for treatment. Only few resorted to herbal or traditional medicines. Interestingly, the study revealed that high proportion of the respondents (73%) practiced self-medication for malaria treatment. The observation is congruent with findings elsewhere [31-33]. This finding contrasts gravely with what obtained in a study carried out among non-medical tertiary students in Osun State, Nigeria, where only 5.7% practiced self-medication [27]. This high level of self-medication could be due to the exposure and knowledge they have gotten in the course of their training or from the work environment. This could have helped to build confidence in them, with resultant high confidence rate (81.3%) in malaria self-care practice, and low patronage of formal case-based management.

Only age predicted significantly the care-response of the respondents in the event of suspected malaria, with younger ones (17–25 years old) more likely to go to buy their drugs from the chemist shops than the older respondents.

This study may be limited by a number of factors: Firstly, since the study was carried out among small group of people in a specific setting, it would be proper to limit the generalization and its findings to similar study settings. Secondly, the use of convenience sampling technique really afforded us easy access to the participants, however, it could have introduced sampling bias and/or distortion of good representation of the population.

## CONCLUSION AND RECOMMENDATION

This study has shown that the level of awareness of the existence of National Antimalarial Treatment Policy is fairly high among Medical/Paramedical students and the members of the teaching staff, though there is still room for improvement. The study recorded high rate of malaria self-care practices among the participants, a phenomenon that was alluded possibly to the medical exposure or training they have had, giving them a kind of confidence to ‘self-treat’ themselves when they had malaria. Though no record of use of Chloroquine antimalarial drug was made, however, few participants were still using sulfadoxine-pyrimethamine for self-medication. Participants showed poor knowledge about the ban of chloroquine and even worse still for sulfadoxine-pyrimethamine. There is need for more concerted efforts through public health interventions to increase awareness of the NATP and NATG, deploy social and behavioral change communication to dissuade the practice of malaria self-

care among youths and students and promote evidence based case management of malaria at all times. With this, we will be able to realize the 'National Malaria Strategic Plan 2014 – 2020' Objective 4, which states: "To provide adequate information to all Nigerians such that at least 80% of the populace habitually takes appropriate malaria preventive and treatment measures as necessary by 2020" [2] .

## REFERENCES

- WHO. (2018). World Malaria Report. Geneva: World Health Organization
- FMOH. (2014). National Malaria Strategic Plan 2014-2020. Abuja, Federal Ministry of Health
- WHO. (2006). WHO briefing on Malaria Treatment Guidelines and artemisinin monotherapies. Geneva: World Health Organization.
- FMOH. (2005). Federal Republic of Nigeria National antimalarial treatment policy. Abuja, Federal Ministry of Health.
- FMOH. (2005). Federal Republic of Nigeria National antimalarial treatment guidelines. Abuja, Federal Ministry of Health.
- WHO. (2015). Guidelines for the Treatment of Malaria. 3rd. Ed. Geneva, Switzerland. *WHO Press*, 27-30.
- FMOH. (2015). National Guidelines for Diagnosis and Treatment of Malaria. Third Edition, Federal Ministry of Health.
- WHO. (2018). High burden to high impact: a targeted malaria response. Geneva: World Health Organization.
- Ezeoke, U. (2009). Malaria self-medication among students of a Nigerian Tertiary Institution. *Int J Med Heal Dev*, 14(1), 1–6.
- Babatunde, O., Fadare, J., Ojo, O., Durowade, K., Atoyebi, O., & Ajayi, P. (2016). Self-medication among health workers in a tertiary institution in South-West Nigeria. *Pan Afr Med J*, 24(312).
- Agueh, V., Badet, M., Jerome, C., Paraiso, M., Azandjeme, C., & Metonnou, C. (2016). Prevalence and determinants of antimalarial self-medication in Southern Benin. *Int J Trop Dis Heal*, 18,1–11.
- Awosusi, A., & Konwea, P. (2015). Self-medication practice among secondary school students in Ekiti State, Southwest Nigeria. *J Adv Med Pharm Sci*, 3, 61–8.
- Osemene, K., & Lamikanra, A. (2012). A study of the prevalence of self-medication practice among university students in southwestern Nigeria. *Trop J Pharm Res*, 11(68), 3–9.
- WHO. (1998). The Role of the pharmacist in self-care and self-medication. Report of the 4th WHO consultative group on the role of the pharmacist. *Technical Report, WHO*. The Hague, Netherlands.
- Abosede, O. (1984). Self-medication: An important aspect of primary health care. *Soc Sci Med*, 19(7), 699–703.
- Hughes, C., McElnay, J., & Fleming, G. (2001). Benefits and risks of self-medication. *Drug Saf*, 24(14), 1027–1037.
- Daniel, W. (6th Ed.). (2013). *Cross C. Biostatistics: A foundation for analysis in the health sciences*. New York: Wiley.
- UniRank-University of Calabar. Retrieved September, 7 2019 from <https://www.4icu.org/reviews/7668.htm>.
- Hussain, A., & Khanum, A. (2008). Self-medication among university student of Islamabad, Pakistan: A preliminary study. *South Med Rev*, 1(1), 14-16.
- Momodu, R. (2008). Knowledge and practice of patent medicine vendors in the use of artemisinin-based combination therapy in the treatment of malaria in an urban community in Lagos. University of the Western Cape. Retrieved from <http://etd.uwc.ac.za/xmlui/handle/11394/2423>.
- Obiebi, I. (2019). Adherence to antimalarial drug policy among doctors in Delta State, Nigeria: implications for malaria control. *Ghana Med J*, 53(2), 109–116.
- Oyedokun F. (2015). Factors influencing compliance with the National Antimalarial Treatment Guideline by Facility-based Secondary Health Care Physicians in Oyo State, Nigeria. University of Ibadan. Retrieved from <http://ir.library.ui.edu.ng/handle/123456789/761>.
- Omole, M. K., Onademuren, O. T. (2010). A survey of antimalarial drug use practices among urban dwellers in Abeokuta, Nigeria. *African J Biomed Res*, 13(1), 1–7.
- Builders, M., Degge, H., Peter, J., & Ogbale, E. (2014). Prescription Pattern of Antimalarial drugs in Teaching Hospital in Nigeria. *Br Med Bull*, 2, 267–276.
- Builders, MI., Akande, T., & Ogundeko, T. (2016). Assessment of antimalarial drug use for children among mothers attending Bingham university teaching hospital in Nigeria. *Sky J Med Sci*, 4(6), 49–55.
- Kalilani-Phiri, L., Lungu, D., & Coghlan, R. (2011). Knowledge and malaria treatment practices using artemisinin combination therapy (ACT) in Malawi: survey of health professionals. *Malar J*, 10, 279.
- Edet-Utan, O., Ojediran, T., Usman, S., AkintayoUsman, N., Fadero, T., & Oluberu, O. (2016). Knowledge, perception and practice of malaria management among non-medical students of higher institutions in Osun State Nigeria. *Am J Biotechnol Med Res*, 1(1), 5–9.
- Ezenduka, C. C., Ogbonna, B. O., Obinna, E. I., Mathew, J., Okonta, M. J., & Esimone, C. O. (2014). Antimalarial Drugs Use Pattern In Retail Outlets In Enugu Urban South East Nigeria; Implication For Malaria Treatment Policy. *Malar J*, 13, 43.
- WHO. (2013). Marketing of oral artemisinin based

- monotherapy medicines. Geneva: World Health Organisation. Retrieved from [http://www.who.int/malaria/marketing\\_of\\_oral\\_artemisinin\\_monotherapies/en/index.html](http://www.who.int/malaria/marketing_of_oral_artemisinin_monotherapies/en/index.html)
30. Tougher, S., Ye, Y., Amuasi, J., Kourgueni, I., Thomson, R., & Goodman, C. (2012). Effect of the Affordable Medicines Facility-malaria (AMFm) on the availability, price, and market share of quality-assured artemisinin-based combination therapies in seven countries: A before-and-after analysis of outlet survey data. *Lancet*, 380, 1916–1926.
  31. Metta, E., Haisma, H., Kessy, F., Hutter, I., & Bailey, A. (2014). “We have become doctors for ourselves”: Motives for malaria self-care among adults in southeastern Tanzania. *Malar J*, 13, 249.
  32. Aborah, S., Akweongo, P., Adjuik, M., Atinga, R., Welaga, P., & Adongo, P. (2013). The use of non-prescribed anti-malarial drugs for the treatment of malaria in the Bolgatanga municipality, northern Ghana. *Malar J*, 12, 266.
  33. Watsierah, C., Jura, W., Raballah, E., Kaseje, D., Abong’o, B., & Ouma, C. (2011). Knowledge and behaviour as determinants of anti-malarial drug use in a peri-urban population from malaria holoendemic region of western Kenya. *Malar J*, 10, 99.