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ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE OF MALARIA MANAGEMENT AND CONTROL AMONG STAFF AND STUDENTS OF DELTA STATE UNIVERSITY, ABRAKA, NIGERIA

[*1]Eniojukan Joshua F, [2]Akiri Florence O

[1]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Niger Delta University, Wilberforce Island, PMB 071, Bayelsa State, Nigeria.

[2]Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, Delta State University, Abraka, PMB 01, Delta State, Nigeria.

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***Correspondence for Author**
Prof. Eniojukan Joshua F.
Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Niger Delta University, Wilberforce Island, PMB 071, Bayelsa State, Nigeria.

ABSTRACT

Globally, malaria is one of the most severe public health problems especially in resource-limited countries. This study evaluated the knowledge, attitude and practice of malaria among the Staff and Students of Delta State University, Abraka in South-South Nigeria. A descriptive cross-sectional survey was carried out among 400 respondents. Data was analyzed with SPSS version 20. There were more female respondents (52.1%); 46.3%, 32% and 21.7% were students, academic staff and non-academic staff respectively; 50% and 41.8% of all respondents had secondary and tertiary education respectively; 86.9% were Christians; 46.6% were single. All (100%) respondents ever heard of malaria and 98.8% knew that Mosquito is the vector; majority (83.5% – 100%) identified sleeping in insecticide treated nets, spraying insecticides, trimming of bushes around the house and Elimination of stagnant water as malaria control measures; Age, occupation and education were correlated with knowledge of malaria. Educational interventions are needed to bridge the gaps in knowledge about malaria chemoprophylaxis and control in this population.

KEYWORDS: Malaria, Knowledge, Practice, Staff, Students, Nigeria.

INTRODUCTION

Malaria continues to be a public health concern globally but mostly in poor tropical and subtropical areas of the world. In these countries, malaria remains a leading cause of morbidity and mortality. Young children and pregnant women constitute the vulnerable populations. The costs of malaria are enormous, not only to individuals and families but it is extended to their communities and nations at large.[1, 2]

Reports had estimated that up to 3.4 billion people, equivalent to half the world's population, live in areas at risk of malaria transmission in 106 countries and territories.[1]

In 2013, about 198 million cases of malaria were said to occur globally involving 500,000 deaths of mostly children in the African Region.[2, 3]

Although appreciable progress has been made but malaria remains a serious public health concern globally. To this extent, it is estimated that, in 2015 alone, 214 million new malaria cases (range 149–303 million) and about 438 000 deaths (range 236 000–635 000) occurred. Further analysis revealed that 15 countries were responsible for 80% of malaria cases and 78% of deaths. Also, it has been revealed that since 2000, the rate of decline in malaria incidence in these 15 countries (32%) fell short of global values (54%). Sub-Saharan Africa remains grossly affected by the malaria scourge. Direct costs, in terms of illness, treatment, premature death, have been valued to be at least US$ 12 billion per year with a much higher cost in lost economic growth. Two countries – the Democratic Republic of the Congo and Nigeria – are said to account for about 40% of estimated global mortality due to malaria.[4, 5] In Africa, malaria is second to HIV/AIDS as the major cause of death from infectious diseases, responsible for 1 out of 5 deaths of children under 5.[3, 6]

In Nigeria, Malaria is a major public health problem responsible for more cases and deaths above other countries in the world. It is reported to be a risk for 97% of Nigeria's population. One hundred million cases with more than 300,000 deaths are said to occur yearly in Nigeria, compared to 215, 000 deaths from HIV/AIDS. Further, malarial is responsible for about 11% of maternal mortality; 60% of out-patient visits and 30% of hospitalizations among children under five years of age. Over 60% of Nigerians live in poverty, a major factor that modulates malaria management and control.[4-7]

Four basic malaria interventions have been introduced in most malaria-endemic countries. These are case management (diagnosis and treatment), Insecticide-treated Nets (ITNs), Intermittent Preventive Treatment in Pregnancy (IPTp) and Indoor residual spraying (IRS) with insecticides. Other interventions occasionally applied include larval control and mass drug administration. Additionally, research efforts are ongoing for the development of a suitable malaria vaccine. Early diagnosis and treatment of malaria reduces disease and prevents deaths. It also contributes to reducing malaria transmission. The best available treatment, particularly for *P. falciparum* malaria, is Artemisinin-based combination therapy (ACT).[2, 7]

This study was conducted to evaluate the knowledge, attitude and practice of malaria management and control among the Staff and Students of Delta State University, Abraka in South-South Nigeria.

METHODS

STUDY SETTINGS

This study was carried out in Abraka campus of Delta State University using the three sites in the town. The institution is comprised of 11 faculties presently which include Faculties of Arts, Education, Social Sciences, Sciences, Basic Medical Science and Pharmacy all situated in Abraka campus.

Study Design

This study was a descriptive cross-sectional survey using a 42-item pre-tested instrument, consisting of 5 sections. Section A consisted of items relating to socio-demographics. Sections B, C, D and E consisted of items relating to basic knowledge, treatment seeking behaviors, attitudes and practice towards malaria prevention respectively. To minimize bias, students and staff of DELSU were chosen irrespective of age or educational status.

Sample Size

The population of study was made up of 100 level to 600 level students belonging to various faculties of the school as well as other academic and non academic staff. All three campuses of Abraka main campus were used. A convenient sample size of 300 was chosen due to logistics but questionnaires were made up to 400 to cover up for any attrition.

Sampling Method/Data Collection

The method of sampling employed was simple random sampling in which every staff and student had an equal opportunity to be entered for the study. Questionnaires were randomly administered to respondents within the study location.

Ethical Consideration

This study was approved by the DELSU Board of Faculty of Pharmacy. Each participant enlisted for this study gave an oral consent before questionnaire administration. Participants were assured of utmost confidentiality of responses.

Statistical Analysis

All sorted data collected were coded and fed into the computer software SPSS (Statistical Package for Social Sciences) version 20 for descriptive and inferential statistics. Statistical correlations using Chi square were done to explore possible associations between socio-demographic variables and several aspects in knowledge, attitude and practice. The level of significance was set at 95% of confidence intervals for p-values.

Inclusion Criteria

The study included: Students belonging to known faculties of DELSU in Abraka, and Academic and Non-Academic staff of DELSU Abraka

Exclusion Criteria

The study did not include: Pre-degree students of the university, and People who had establishments within the school premises but were not staff of the university.

RESULTS

Response Rate

A total of 400 questionnaires were distributed, 356 were retrieved and after sorting, a total of 328 were considered valid giving a response rate of 82%.

Demographics

Table 1 gives details of the demographic characteristics of the respondents. There were more female respondents (52.1%) than males (47.9%); 46.3%, 32% and 21.7% were students, academic staff and non-academic staff respectively. Majority (80.3%) of the students were aged between 21-30 years; 74.3% of academic staff were aged between 31 – 40 years while 77.5% of non-academic staff were aged 31 years and above. Regarding education, 50% and

41.8% of all respondents had secondary and tertiary education respectively. Majority (86.9%) were Christians; 46.6% were single and 47.9% were married.

Table1: Socio-demographic characteristics of respondents categorized based on occupation.

Item		Student n(%) n=152	Academic staff n(%) n=105	Non-academic staff n(%) n=71	Total n(%) n=328
Sex	Male	71(46.7)	50(47.6)	36(50.7)	157(47.9)
	Female	81(53.3)	55(52.4)	35(49.3)	171(52.1)
Age group	<20	30(19.7)	0(0.0)	0(0.0)	30(9.1)
	21-25	67(44.1)	0(0.0)	0(0.0)	67(20.4)
	26-30	55(36.2)	0(0.0)	6(8.5)	61(18.6)
	31-35	0(0.0)	46(43.8)	10(14.1)	56(17.1)
	36-40	0(0.0)	32(30.5)	25(35.2)	57(17.4)
	41 and over	0(0.0)	27(25.7)	30(42.3)	57(17.4)
Education	Primary	0(0.0)	0(0.0)	27(38.0)	27(8.2)
	Secondary	151(99.3)	0(0.0)	13(18.3)	164(50.0)
	Tertiary	1(0.7)	105(100.0)	31(43.7)	137(41.8)
Religion	Christianity	137(90.1)	86(81.9)	62(87.3)	285(86.9)
	Islam	4(2.6)	9(8.6)	2(2.8)	15(4.6)
	Traditional	11(7.2)	10(9.5)	7(9.9)	28(8.5)
Marital status	Single	135(88.8)	12(11.4)	6(8.5)	153(46.6)
	Married	17(11.2)	90(85.7)	58(81.7)	165(47.9)
	Divorced	0(0.0)	0(0.0)	2(2.8)	2(0.6)
	Widow(er)	0(0.0)	3(2.9)	5(7.0)	8(2.4)

Respondents' Knowledge and Sources of Information about Malaria

All (100%) respondents ever heard of malaria and nearly all (98.8%) knew that Mosquito is the vector and nearly all (99.7%) affirmed that bites from malaria-infected mosquito are the mode of transmission. All respondents (100%) identified Fever, Headache and Chills/rigors as signs and symptoms of malaria; a majority (89.9%) identified Loss of appetite as a symptom of malaria.

For all respondents, the sources of information about malaria are Television/Radio (50.6%), Health worker (31.4%) and Bulletins/Internets (19.8%).

Table2: Respondents' Knowledge Sources of information about malaria.

Item	**	Student n(%) n=152	Academic staff n(%) n=105	Non-acad staff n(%) n=71	Total n(%) n=328
Heard of malaria	Yes	152(100.0)	105(100.0)	71(100.0)	328(100)
Vector	Mosquito	149(90.0)	105(100.0)	70(98.6)	324(98.8)
	Not sure	3(2.0)	0(0.0)	1(1.4)	4(1.2)

Mode of transmission				
Drinking contaminated water	12(7.9)	0(0.0)	0(0.0)	12(3.7)
Eating of contaminated food	3(2.0)	0(0.0)	0(0.0)	3(0.9)
Bites from malaria-infected mosquito	151(99.3)	105(100.0)	71(100.0)	327(99.7)
Not sure	1(0.7)	0(0.0)	(0.0)	1(0.3)
Signs and symptoms				
High Temperature/Fever Headache	152(100.0) 152(100.0)	105(100.0) 105(100.0)	71(100.0) 71(100.0)	328(100.) 328(100)
Blurred vision	18(11.8)	47(44.8)	31(43.7)	96(29.3)
Vomiting	102(67.1)	66(62.9)	39(54.9)	207(63.1)
Loss of appetite	143(94.1)	89(84.8)	63(88.7)	295(89.9)
Loss of energy	136(90.8)	102(97.1)	64(90.1)	302(92.1)
Chill/rigors	152(100.0)	105(100.0)	71(100.0)	328(100)
Sources of information about malaria				
Television/ Radio	86(56.6)	44(41.9)	36(50.7)	166(50.6)
Health Worker	19(12.5)	80(7.6)	4(5.6)	102(31.4)
Bulletin/ Internet	19(12.5)	30(28.5)	16(22.5)	65(19.8)
Others	48(31.6)	67(63.8)	16(22.5)	131(39.9)

****** Note: percentages do not add up due to multiple responses.

Respondents' Knowledge of Malaria Vectors, Control Policies and Consequences

Regarding methods of malaria prevention and control, majority (83.5 – 100%) of all respondents identified sleeping in insecticide treated nets, spraying insecticides, trimming of bushes around the house, and Elimination of stagnant water. 98.1% and 91.5% respectively of academic and non-academic staff opined that wearing sweater always can serve as a means of preventing and controlling malaria.

Regarding mosquito's feeding time, 56.7% of respondents identified Day and Night, whilst 32% identified Night time.

Majority (70.7%) of respondents believed untreated malarial can lead to death; fainting 48.5% and Coma (24.4%).

Regarding consequences of untreated malaria in pregnant women, 50.3% of respondents identified death of both fetus and mother; death of fetus (36.3%) and death of mother (21.6%).

Regarding malaria policies, 75.3% of all respondents were aware of free malaria treatment for under five and pregnant women; 32% were aware of roll back malaria programme in Nigeria. See Table 3 for details

Table3: Respondents' Knowledge of Malaria Vectors, Control Policies and Consequences.

Item		Student n(%) n=152	Academic staff n(%)n=105	Non-acad staff n(%) n=71	Total n(%)n=328
Methods of prevention and control					
Sleeping in insecticide treated nets		100(65.8)	105(100)	69(97.2)	274(83.5)
Wearing sweater always		31(20.4)	103(98.1)	65(91.5)	199(60.7)
Spraying insecticides		146(91.1)	96(91.4)	52(73.2)	294(89.6)
Trimming of bushes around the house		149(98.0)	105(100)	71(100)	325(99.1)
Elimination of stagnant water		152(100)	105(100)	71(100)	328(100)
Praying before sleeping		18(11.8)	0(0.0)	0(0.0)	18(5.5)
Mosquito feeding time					
Day time		12(7.9)	6(5.7)	2(2.8)	20(6.1)
Night time		34(22.4)	44(41.9)	27(38.0)	105(32.0)
Day and night		98(64.5)	52(49.5)	36(50.7)	186(56.7)
Not sure		8(5.3)	3(2.9)	6(8.5)	17(5.2)
Consequences of untreated malaria					
Fainting		78(51.3)	34(32.4)	47(66.2)	159(48.5)
Coma		41(27.0)	16(15.2)	23(32.4)	80(24.4)
Kidney failure		8(5.3)	14(13.3)	4(5.6)	27(8.2)
Death		89(58.6)	96(91.4)	47(66.2)	232(70.7)
Not sure		53(34.8)	9(8.6)	19(26.8)	81(24.7)
Consequences of untreated malaria in pregnant women					
Death of mother		18(11.8)	41(13.3)	12(16.9)	71(21.6)
Death of fetus		59(38.8)	41(39.0)	19(26.8)	119(36.3)
Death of both		75(49.3)	50(47.6)	40(56.3)	165(50.3)
Not sure		35(23.0)	18(17.1)	21(29.6)	74(22.6)
Awareness of free malaria treatment for under five and pregnant women					
	Yes	112(80.3)	86(81.9)	49(69.0)	247(75.3)
	No	30(19.7)	19(18.9)	22(31.0)	71(21.6)
Awareness of roll back malaria programme in Nigeria					
	Yes	50(32.9)	29(27.6)	26(36.6)	105(32.0)
	No	102(67.1)	76(72.4)	45(63.4)	223(68.0)

Respondents' Knowledge of safe antimalarial drugs in pregnancy and Treatment – seeking behaviour

Regarding drug use during pregnancy, 18.6% opined that Sulphadoxine/pyrimethamine is not safe in pregnant women; 27.7% believed Chloroquine is the safest antimalarial in pregnancy.

Over half (51.2%) of respondents ever had malaria. If they had malaria, over half (56.1%) would go to the Pharmacy/Chemist, 27.2% would visit the hospital, and 11.3% would do nothing.

Regarding lead-time for seeking treatment after suspecting a malaria attack, over half (53.0%) said within 24 hours and 29.3% within 2-3 days. See Table 4 for details.

Table4: Respondents' Knowledge of safe antimalarial drugs in pregnancy and Treatment –seeking behavior.

Item		Student n(%) n=152	Academic staff n(%) n=105	Non-acad staff n(%) n=71	Total n(%)n=328
Sulphadoxine/pyrimethamine not safe in pregnant women					
	Yes	35(23.0)	18(17.1)	8(11.3)	61(18.6)
	No	30(19.7)	17(16.2)	17(23.9)	64(19.5)
	Don't know	87(57.2)	70(66.7)	46(64.8)	203(61.9)
Chloroquine is the safest antimalarial in pregnancy					
	Yes	43(28.3)	29(27.6)	19(26.8)	91(27.7)
	No	35(23.0)	18(17.1)	21(29.6)	74(22.6)
Treatment seeking behaviors					
Have you suffered from malaria in the past 4weeks					
	Yes	104(68.4)	35(33.3)	29(40.8)	168(51.2)
	No	48(31.6)	70(66.7)	42(59.2)	160(48.8)
Where would you seek for treatment when ill					
Hospital		47(30.9)	26(24.8)	16(22.5)	89(27.2)
Pharmacy/Chemist		91(59..9)	51(48.6)	42(59.2)	184(56.1)
Tradomedical home		5(3.3)	11(10.5)	2(2.8)	18(5.5)
Do nothing		9(5.9)	17(16.2)	11(15.5)	37(11.3)
Time to seek treatment after suspecting malaria					
Within 24 hrs		95(62.5)	46(43.8)	33(46.5)	174(53.0)
2-3 days		40(26.3)	35(33.3)	21(29.3)	96(29.3)
4-6 days		8(5.3)	7(6.7)	6(8.5)	21(6.4)
Do nothing		9(5.9)	17(16.2)	11(15.5)	37(11.3)

Respondents' Knowledge of Management of malaria and Information Needs

For prophylaxis of malaria, 17.1% and 11.3% respectively identified Mefloquine and Primaquine; 58.5% of respondents were not sure of drugs used for malarial prophylaxis. For drug treatment of malaria, all (100%) respondents identified Chloroquine; over half (58.2%) identified Artemether/Lumefantrine and 38.4% identified Amoxicillin.

Regarding knowledge of malaria management, 40.2% of all respondents claimed to have enough knowledge; 30.8% were not sure.

On their information needs about malarial management, respondents identified Side effects/ADRs (27.4%), drug treatment (18.9%), Control (17.4%) and Prevention (12.8%). See Table 5 for details.

Table5: Respondents' Knowledge of Management of malaria and Information Needs.

Item		Student n(%) n=152	Academic staff n(%) n=105	Non-Acad staff n(%) n=71	Total n(%)n=328
Knowledge of drug for prevention and treatment of malaria					
Drug(s) used for prevention of malaria					
	Primaquine Mefloquine Aspirin	16(10.5) 30(19.7) 22(14.5)	20(19.0) 24(22.9) 6(5.7)	1(1.4) 2(2.8) 1(1.4)	37(11.3) 56(17.1) 29(8.8)
	B-complex	11(7.2)	2(1.9)	1(1.4)	14(4.3)
	Don't know	73(40.0)	53(50.5)	66(93.0)	192(58.5)
Drugs for treatment of malaria					
Chloroquine Artemether/Lumefantrine Amoxicillin		152(100) 73(48.0) 91(59.9)	105(100.0) 87(82.9) 13(12.4)	71(100.0) 31(43.7) 22(31.0)	328(100) 191(58.2) 126(38.4)
Knowledge deficiency and needs of respondents					
Have enough knowledge in management of malaria					
	Yes No Don't know	61(40.1) 46(30.3) 45(29.6)	47(44.8) 26(24.8) 32(30.5)	24(33.8) 23(32.4) 24(33.8)	132(40.2) 95(29.0) 101(30.8)
Information needed about malaria					
	Drug treatment Control Prevention	20(43.5) 40(87.0) 32(69.6)	19(73.1) 4(15.4) 1(3.8)	23(100.0) 13(56.5) 9(39.1)	62(18.9) 57(17.4) 42(12.8)
	Signs and symptoms	0(0.0)	0(0.0)	0(0.0)	0(0.0)
	Side effects/ADRs	46(100)	22(84.6)	22(95.7)	90(27.4)

Association of socio-demographics with respondent's correct knowledge

There was no correlation ($p>0.05$) between gender and respondents' knowledge of Signs/Symptoms, Prevention/Control and Feeding time of mosquitoes.

Respondents' Age was correlated ($p<0.05$) with their knowledge of Signs/Symptoms and feeding time of mosquitoes but not with Prevention/control ($p>0.05$). Respondents aged 20-25 seemed to have greatest knowledge of Signs/Symptoms; respondents aged 41 years and above had greatest knowledge of feeding times of mosquitoes.

Respondents' occupation was correlated ($p<0.05$) with knowledge of Signs/symptoms and Prevention/control but not with feeding time of mosquitoes. The trend was Students>Academic staff> Non-academic staff.

Respondents' knowledge of all aspects was correlated with educational level ($p=0.000$). For signs/symptoms and Prevention/Control, the trend was Secondary>Tertiary> Primary. For

feeding times of mosquitoes, the trend was Tertiary>Secondary>Primary. See Table 6 for details.

Table6: Association of socio-demographics with respondent's correct knowledge.

Variable	Signs and symptoms N=327			Prevention and control N=114			Feeding time N=109		
	n(%)	X^2	p-value	n(%)	X^2	p-value	n(%)	X^2	p-value
Gender									
Male	157(48.0)	0.517	0.472	61(53.5)	0.561	0.454	57(52.3)	0.229	0.632
Female	170(52.0)			53(46.5)			52(47.7)		
Age group									
<20	30(9.2)	14.706	0.012	12(10.5)	3.368	0.643	23(21.1)	14.028	0.015
21-25	67(20.5)			20(17.5)			10(9.2)		
26-30	60(18.3)			21(18.4)			23(21.1)		
31-35	56(17.2)			22(19.3)			22(20.2)		
36-40	57(17.4)			19(16.7)			23(21.1)		
≥41	57(17.4)			20(17.5)			39(35.8)		
Occupation									
Student	151(46.2)	29.421	0.000	50(43.9)	7.579	0.023	41(37.6)	2.275	0.321
Acad staff	105(32.1)			38(33.3)			41(37.6)		
Non-acad staff	71(21.7)			26(22.8)			29(26.6)		
Highest level of education									
Primary	27(8.2)	95.633	0.000	10(8.8)	31.158	0.000	10(9.2)	28.972	0.000
Secondary	163(49.7)			54(47.4)			47(43.1)		
Tertiary	137(41.8)			50(43.9)			52(47.7)		

Association of positive attitudes with occupation of respondents

Majority of the positive attitudes were correlated with respondents' occupation ($p<0.05$). The trend was Students>Academic staff> Non-academic staff. Non-correlation was recorded with the attitudes that "it is dangerous when malaria medicines are not taken completely" ($p= 0.247$) and "I should see the physician/pharmacist when I suspect symptoms of malaria" ($p= 0.066$). See Table 7 for details.

Table7: Association of positive attitudes with occupation of respondents.

Item	N	Student n(%)	Academic staff n(%)	Non-academic staff n(%)	X^2	p-value
I think that malaria is a serious and life-threatening disease						
	289(88.1)	137(47.4)	91(31.5)	61(21.1)	30.422	0.000
I am sure that anyone can be infected with malaria						
	289(88.1)	133(46.0)	90(31.1)	66(22.8)	23.924	0.000
In my opinion, only children and pregnant women are at risk of malaria						
	202(61.6)	89(44.1)	71(35.1)	42(20.8)	16.703	0.000
I think that one can recover spontaneously from malaria without ant treatment						
	240(73.2)	93(38.8)	88(36.7)	59(24.6)	8.425	0.015

If someone has got malaria, people should avoid having close contacts with them						
	251(76.5)	116(56.2)	79(31.5)	56(22.3)	21.904	0.000
I think it is dangerous when malaria medicines are not taken completely						
	20(6.1)	10(50.0)	4(20.0)	6(30.0)	2.800	0.247
I think I should see the physician/pharmacist when I suspect symptoms of malaria						
	21(6.4)	9(42.9)	10(47.6)	2(9.5)	5.429	0.066
I think Artemisinin-based comb (ACT) is the current recommended drug for malaria management						
	151(43.0)	65(43.0)	59(39.1)	27(17.9)	16.583	0.000
I think malaria is a spiritual attack						
	309(94.2)	144(46.6)	99(32.0)	66(21.4)	29.767	0.000

X^2 is significant at $p<0.05$.

Association of occupation with respondents' level of practice

The use of anti-mosquito sprays in the house and Use of drugs for prophylaxis were not correlated with occupation of respondents ($p>0.05$). The use of insecticide treated nets, clearing of bushes around house and draining of stagnant water near house were all correlated with respondents' occupation. See Table 8 for details.

Table8: Association of occupation with respondents' level of practice.

Item		Student n(%)	Academic staff n(%)	Non-academic staff n(%)	X^2	p-value
Use of insecticide treated nets	Always	12(7.9)	17(16.2)	14(19.7)	11.037	0.026
	Sometimes	58(38.2)	33(31.4)	15(21.1)		
	Never	8(5.3)	8(7.6)	4(5.6)		
Use of anti-mosquito sprays in the house	Always	69(45.4)	46(43.8)	27(38.0)	1.087	0.581
	Sometimes	83(54.6)	59(56.2)	44(62.0)		
Clearing of bushes around house	Always	79(52.0)	69(65.7)	55(77.5)	17.533	0.002
	Sometimes	65(42.8)	28(26.7)	12(16.9)		
	Never	8(5.3)	8(7.6)	4(5.6)		
Draining of stagnant water near house	Always	59(38.8)	45(42.9)	21(29.6)	11.043	0.026
	Sometimes	76(50.0)	53(50.5)	34(47.9)		
	Never	17(11.2)	7(6.7)	16(33.5)		
Use of drugs for prophylaxis	Always	25(16.4)	17(16.2)	5(7.0)	4.664	0.324
	Sometimes	104(68.4)	70(66.7)	58(78.9)		
	Never	23(15.1)	18(17.1)	10(14.1)		

DISCUSSION

Response Rate and Demography

A total of 328 respondents out of 400 were enlisted for this prospective study of which students accounted for 152(46.3%), academic staff 105 (32.0%) and non-academic staff

accounted for 71 (21.6%) of the study population. The most predominant age group for this study was found to be 21-25 years, which made up 67(20.4%) of the study population. This finding obviously explains the fact that it was a random study and carried out in an academic environment where the majorities were students. Christianity emerged as the most prevalent religion as over 80% of the respondents were found to be Christians. Delta State, where Abraka is located, is predominantly Christian.[8]

Malaria Knowledge and Awareness

Malaria, since recent past, has been a major public health issue which has resulted to a great number of morbidity and mortality, especially in tropical and sub-tropical regions of the world and accounting for over 90% of disease burden.[1] There has been a steady increase in awareness campaign programmes aimed at disseminating information on malaria. This study revealed that all (328, 100%) the respondents were very much aware of the disease. This finding is consistent with previous studies,[9, 10] which reported high awareness. This finding is partly due to the increased public awareness campaign programmes by both medical and pharmacy students on campus and partly from mass media, especially finding out that over 50% of the respondents got information on malaria from television/radio. This finding is in contrast with two other studies done in Nigeria which showed that the most predominant source of information on malaria was from neighbors.[11, 12]

Over 90% of the respondents rightly reported mosquito as the insect vector for the parasite, revealing an encouraging level of knowledge on vector. This high level of knowledge is not unconnected to the fact that this study was conducted in an academic environment. This also translated to the high level of knowledge on the correct mode of transmission (over 95%) as bites from infected mosquito. However, a handful of the respondents reported drinking contaminated water (3.7%) and eating contaminated foods (0.9%). This finding is in contrast to a recent study.[12]

Malaria Signs/Symptoms and Complications

Malaria, when left untreated, results to serious consequences such as anaemia, encephalopathy, kidney failure, coma and ultimately death. Over half of the respondents reported death as the most serious consequence of untreated malaria. Untreated malaria in pregnancy can also be very dangerous to the foetus and the mother. This can result to complications such as low birth weight and even death of both mother and foetus which was rightly reported by over half of the respondents.

Amidst several symptoms, the most common symptoms of malaria are high temperature (fever) and chills. This study has revealed not too encouraging level of knowledge on signs and symptoms of malaria as respondents gave mixed responses. This finding is comparable with similar studies.[13, 14]

Malaria Prevention and Control

There was a high level of knowledge on preventive measures and control of malaria which is consistent with several other studies done in Nigeria[15, 16] and Ethiopia.[9]

Mosquitoes are more active at night and so, bite and feed at nights. The respondents demonstrated poor knowledge on this aspect of malaria feeding habit, especially the students, as over half of the study population reported day and night.

Vector control is the main way to prevent and reduce malaria transmission. Two forms of vector control are effective in a wide range of circumstances: insecticide-treated mosquito nets (ITNs) and indoor residual spraying (IRS).

Between 2000 and 2015, the proportion of children sleeping under an ITN in sub-Saharan Africa increased from less than 2% to approximately 68%. In 2015, an estimated 7% of children at risk of malaria in this region lived in a household protected by IRS. However, 25% of children in sub-Saharan Africa still live in a household with no ITN and no protection provided by IRS. These prevailing factors undermine efforts to reduce the scourge of malaria.[3, 4]

Treatment seeking behaviour and Lead-time for seeking treatment

One interesting finding from this study was that most of the respondents (56.1%) would seek for treatment from pharmacy/chemist once ill with malaria; only 27.2% considered seeking treatment in the hospital. This is similar to a study showing that up to 63% of all fever cases seek treatment first in the private sector and only 26% of household members with fever first sought treatment at a government facility.[17] This may be due to the fact that these drug stores are readily available and easily accessible to the general public. However, this study is in contrast with that done in Ethiopia[18] which found a discordant health-seeking behavior.

The treatment-seeking behaviour exhibited in this study should be viewed with caution. It is quite appropriate to seek treatment for basic medical problems like malaria from a qualified professional like the pharmacist. In this sense, seeking treatment in the pharmacy is in order

and rational. The use of "Chemists" that are mostly run by unqualified personnel leaves much to be desired. What is most desirable is that everybody should be knowledgeable enough to respond promptly and appropriately to malaria attacks but without hesitation for referral to qualified health professionals. Inappropriate self-medication predisposes to development of severe malaria with consequently increased mortality. Respondents in this community need to be adequately educated on the appropriate treatment-seeking behaviour.

This study also found that most of the respondents would seek for treatment within 24 hours of suspecting malaria. This behavior can be explained by the fact that antimalarial drugs are readily available over-the-counter and also due to their high level of awareness of the disease and the routine and regular public enlightenment programmes. Prompt treatment response is highly recommended in order to forestall the development of severe malaria and its deleterious complications, especially in children and pregnant women.

Malaria Chemotherapy and Chemoprophylaxis

Both typhoid and malaria share socio- circumstances which are imperative to their transmission. Even though the exact mechanisms to explain the association between malaria and typhoid is not known, it has been shown that antibody response to O antigen of *S. Typhi* was markedly reduced in acute episode of malaria. [19] Therefore, a person living in an endemic region such as Nigeria is at great risk of contracting both typhoid and malaria, considering the poor hygienic state of most parts of the country. This has led some physicians to empirically prescribe antibiotics sensitive to the causative microorganism. Such practice could be the reason why some respondents in this study reported amoxicillin as drug for the treatment of malaria.

Artemisinin-based combination therapy (ACT) has become the standard treatment of uncomplicated malaria in Nigeria. Despite the National Policy of ACT, studies showed that over 70% of children treated for malaria in Nigeria still received Chloroquine or Sulphadoxine-Pyrimethamine (SP).[6, 20]

A poor knowledge of prophylactic antimalarial drugs was also observed among staff and students of Delta State University, with some even believing Aspirin and Vitamin B-complex were prophylactic antimalarial drugs.

This poor level of knowledge calls for proper orientation of staff and students of the institution.

Malarial treatment during Pregnancy

About one-fifth of respondents were certain that SP was safe during pregnancy; over 60% was not sure. Further, about one-third of respondents believed that Chloroquine was the best drug for use during pregnancy. These responses are unsatisfactory and require appropriate educational interventions. This is essentially because malaria infection in pregnant women is associated with high risks of both maternal and peri-natal complications. Pregnant women have been shown to be three times more likely to develop severe disease which can lead to abortion, premature delivery, reduced birth weight, congenital infection and peri-natal death.[21] Malaria in pregnancy therefore demands prompt and rational treatment, taking into consideration the possible dr**u**g effects on both mother and fetus.

Both Sulphonamides and Pyrimethamine are generally considered safe in the second and third trimesters of pregnancy except with known history of hypersensitivity.[20]
SP is currently used as IPTp to all pregnant women as it is said to be an effective means of reducing the effects of malaria in both mother and fetus.[2, 20, 22, 23]

Chloroquine is no longer recommended for routine malaria treatment because of resistance problems with *P.falciparum* It may, however, be used to treat *P. vivax*, *P. ovale* or *P. malariae*. Primaquine is not to be used in pregnancy.[20, 24]

It is further recommended that pregnant women should also receive iron/folate supplementation to forestall the advent of anemia.[2]

Knowledge Gaps

About one-third of the respondents self-reported areas of knowledge deficiencies in certain aspects of malaria, especially in the areas of drugs' side effects, drug treatment options and control of malaria. These gray areas can be addressed by concerted efforts aimed at improving knowledge on malaria. Health professionals are expected to provide appropriate information and education to their patients / clients.

Policies

Three-quarters of respondents knew of the policy of free treatment for children under 5 years. This is appreciably high but can still be beefed up through public enlightenment programmes.

Further, the government of Nigeria supports the provision (free-of-charge) of ITNs, IPTp, IRS, larval source management, and diagnosis and treatment of uncomplicated and severe malaria under the new strategic plan 2014-2020.[17]

However, only about one-third of respondents were familiar with the Roll Back Malaria (RBM) programme. Emphasis may not have been specifically laid on RBM during public campaigns on Malaria; RBM being a Partnership launched by WHO, UNICEF, UNDP and World Bank to provide a global framework for mobilizing resources and implementing coordinated action against malaria[25] details of which may not be for public consumption.

Associations

In a community study on the knowledge of malaria conducted in 2013,[26] there was a significant association between knowledge and gender, which revealed that females had better knowledge on malaria than their male counterpart. This study is in contrast as no association was found ($p>0.05$). This most probably could be due to the fact that both sexes had equal opportunity to information on malaria since it was conducted in an academic environment.

Age was significantly associated with knowledge of signs and symptoms and mosquito feeding time ($p<0.05$), but not with prevention and control ($p>0.05$).

No previous study in Nigeria compared occupation with knowledge of malaria. This study attempted to find if there existed any association and found significant association between occupation and knowledge of signs and symptoms ($p<0.0001$), prevention and control ($p<0.05$), but none with feeding time ($p>0.321$). Students appeared to have the best knowledge on aspects of malaria than academic and non-academic staff. This finding could be the reason for their best attitude towards malaria as found from this study. But this did not translate into good practice.

There were also significant associations found between level of education and knowledge of aspects of malaria ($p<0.0001$) which is comparable with earlier studies.[27-29]

CONCLUSION

Knowledge and awareness about malaria are relatively high in this population. All the respondents were very much aware of the disease with over 50% deriving information on

malaria from television/radio. Over 90% of respondents correctly identified the insect vector for the parasite and the mode of transmission.

There was a high level of knowledge on preventive measures and control of malaria among the population. However, a shallow level of knowledge of signs and symptoms of malaria was exhibited in this study. Further, gaps still existed in their knowledge of chemotherapy and chemoprophylaxis, especially during pregnancy. Most of the respondents would seek for treatment from the community pharmacies and chemist shops as opposed to hospitals. This is rational provided they receive optimal therapy in these facilities. The lead-time of within 24 hours for seeking treatment is also optimal but respondents should be counseled on the benefits of prompt treatment.

Majority of respondents knew of the policy of free treatment for children under 5 years. This is a plus towards mobilizing the under 5s for prompt treatment and possible reduction in morbidity and mortality.

Age, occupation and education were correlated with knowledge of malaria. Also, positive attitudes and level of practice were partially correlated with occupation. Educational interventions are needed to enhance the knowledge about malaria management, prevention and control in this population.

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