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Status of malaria-related knowledge in school-going children in Cameroon

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ABSTRACT

Malaria is a parasitic disease transmitted when an infected female Anopheles mosquito feeds on humans. The most severe form of malaria is caused by parasites of the species Plasmodium falciparum. Cameroon's response to malaria prevention is through the use of insecticide treated mosquito nets and indoor residual spraying. The objective of this study was to assess the level of malaria-related knowledge in school-going children. Specifically, this study set out to understand children's knowledge about what malaria is, how it is transmitted, treatment seeking patterns, preventive measures. 384 school children aged between 7 and 16 from villages in Meme Division, in Cameroon took part in the study. A semi-structured questionnaire was administered to the children. The results of this study showed that 74.7% of the respondents were able to describe malaria as a disease caused by a parasite, 87.8% claimed possess a mosquito net (mostly obtained as a donation) even though not all said they slept in the mosquito net; 37.5% acknowledged road-vendors as main source of malaria drug purchases. The results of this study have revealed the knowledge that children have with respect to malaria. It has shown that the children are aware of what malaria is and the ways in which malaria can be transmitted. The results obtained are used to provide baseline knowledge about malaria in children and indicate areas to focus with respect to strengthening the knowledge as well as improving education about malaria.

Keywords: children's knowledge on malaria, malaria prevention, advantages of mosquito nets, inconveniences of mosquito nets.

INTRODUCTION

Malaria is a parasitic disease transmitted through the bite of an infected female Anopheles mosquito when it feeds on humans. The most severe form of malaria is caused by parasites of the species *Plasmodium falciparum*. Malaria is a disease of major public health importance. In 2010 alone, over 216 million malaria cases were reported [1]. Even though malaria is a killer disease, it is quite preventable through indoor residual spraying, the use of insecticide-impregnated mosquito nets and filling of pot-holes with standing water. The ripple effects of malaria start with the individuals who are suffering from the attacks to their family but can also be felt in the economy of a nation since it is the leading cause why absences are registered at work in countries like Cameroon. It is the leading cause of death of children in Sub-Saharan Africa. In Cameroon, malaria accounts for up to 57% of consultations in health facilities [2]. Also most absences from schools can be attributed to a malarial attack [2]. Being considered as one of the major poverty-related diseases and an item on the millennium development goals-target 6C[3] to be eradicated, it is important to put all efforts on deck to combat this disease. The strategies that are recommended by the WHO to tackle malaria do not lay emphasis on the importance of sensitisation or education of people about malaria[3] this oversight being potentially a major set-back to the results that can be obtained. The consequences of malaria are felt hardest on children especially those five years and below and also on pregnant women. According to

UNICEF, a child dies every thirty seconds from malaria, a figure that is exacerbated with the absence of proper nutrition, hygiene and poverty. Many studies [4, 5, 6, 7] have been carried out to investigate the knowledge, attitudes and practices of people with respect to malaria but only very rarely would you find one which relates to what children know about malaria[8]. Teaching children about disease prevention or hygienic practices increases knowledge, shapes norms and builds skills and value and enables them to manage their own health and get help when they need it. The importance of knowing how much children know about the diseases that affect them is essential in reducing the spread and the burden of these diseases. This study was carried out with the objectives to a) identify the knowledge of primary school children about malaria, its transmission and how it can be prevented, b) to evaluate the prevention practices concerning malaria undertaking in their homes and c) to find out if the experience of disease, knowledge and practices with respect to the disease corresponded with the parasitaemia results. This in a bid to provide a baseline about this knowledge in order to come up with specifically appropriate and targeted health messages to meet the most susceptible children.

MATERIALS AND METHODS

Study area:
Ethical clearance was obtained from the Ethical Committee of the Institute of Medical Research and Medicinal Plant Studies (IMPM) of the Ministry of Scientific Research and Innovation, Cameroon. This paper reports a part of a wider study which was carried out in Mbongue sub-division, South-west region, Cameroon. Four villages: Marumba I, Marumba II, BaiManya, and Pete Bakundu villages took part. Marumba I and II are respectively 22.2 and 23.7km from Kumba a large town with about 144413 inhabitants. Pete is about 25.2km from Kumba. BaiManya having coordinates latitude 431'42.996''N and longitude 918'1.008E is about 3km from Marumba II. Pete, Marumba I and Marumba II are found in Oroko land which covers about two-thirds of the landmass of Meme and Ndian divisions. In this area, most of the inhabitants are small-scale or peasant farmers and have a low level of education(primary school).

Study Population:
This study recruited 364 pupils from the sole primary school in the four villages cited above. The children were from classes 3, 4, 5, and 6 of the primary school education level. Informed consent was obtained from the guardians and parents of the pupils as well as the headmaster of each school. The age range of the pupils was from 7 years to 16 years. The parents and guardians accepted that all the children be part of the study and signed the informed consent. The temperature of the children was taken alongside other samples which were collected to determine malaria, anaemia, and helminth infection[9]. Temperature was taken to find if there was any fever in the children. Other data collected for the children included were: age, weight, height, middle upper arm circumference (MUAC), and head circumference. The height was obtained using seca 225 statometer while the MUAC was obtained with seca measuring tape 201.

Study design and data collection:
This study is a descriptive cross-sectional primary school based survey. For this study, a pre-tested semi-structured questionnaire was designed to collect the required information. This questionnaire was delivered with the assistance of the teachers of each class in each school. All the children of the classes selected took part in the study. The survey started from class three primary school because we expected that at the age of seven and above, children are able to understand and answer questions with respect to malaria. In class three, the questionnaires were administered in interview form while for those in the higher primary classes (4,5,6), the questionnaires were answered by the children themselves after the questions were read out loud first to ensure that they were understood. Demographic data was also collected from the children

Data analysis:
The responses of the respondents were classified and analysed. Univariate analysis was done using the SPSS software. Descriptive statistics was done for the variables included in the questionnaire. Themes were also identified in the responses and these were labeled against the responses in order to give an ordered picture of the knowledge and practices of the respondents relative to malaria.

RESULTS AND DISCUSSION

Overall 364 primary school children took part in this study as shown in table 1 below. Parents and guardians of the children were mostly farmers with a low level of education(primary school education as maximum level- 79.9%).

Table 1: Gender distribution of the respondents

Village	Sex			
	Male		Female	
	N	N %	N	N %
Bai_Manya	44	43.6	57	56.4
Marumba 1	12	48.0	13	52.0
Marumba 2	44	46.8	50	53.2
Pete_Bakundu	78	54.2	66	45.8
Total	**178**	**48.9**	**186**	**51.1**

Disease history and treatment of the children in the past 3months:

The results of this study showed that in the 3 months prior to the study, 28.9% of the children were sick of malaria while 86.3% of the children had been sick of other ailment and usually in combination. The three most common ailments mentioned were fever, cough, and headaches (41.5, 30.2, 36% respectively), diarrhoea was reported at 9.1% while worm infections were mentioned at 16.8%. Fever and headaches are reported as being very common understandably because these symptoms accompany many types of illnesses and are seen as illnesses instead of symptoms by the respondents. The dusty nature of the roads and environment as was noticed during this field work corroborates the likelihood of inhabitants of these villages having cough frequently. Worm infections can be explained by the lack of hygienic practices. In this study area there are no toilets in schools and also no tap water. Water used for drinking here is obtained mostly from streams. The results also showed that 56.7% of the respondents used mostly water from the stream and 26.1% from wells. The diseases mentioned above were self-treated in most cases (71.1%). Others received treatment from the health center(17.7%) or traditional healers(11.2%).

Perception and knowledge about malaria

An open question was asked to the children for them to define malaria. The responses obtained were as follows: 74.7% described malaria as a disease caused by a parasite, 10.5% as a disease that causes headache and 9.5% described it as either of the following which were grouped together under 'other': stomach warmness, whiteness of eyes, death, madness, and shivering, vomiting, diarrhea. Some of the responses obtained are way off and emphasize the need for correct, appropriate malaria-health related information to be given to the children. It should be noted that some of these definitions represent the symptoms which accompany a malarial attack. Madness, which is one of the definitions given by the respondents for malaria is usually attributed to what is seen when a patient is under a cerebral malarial attack. This indicates an experience by the respondent of someone suffering from cerebral malaria. The results therefore show that most of the respondents could define malaria and this is similar to reports obtained in Zimbabwe[8]. The children were also able to say how transmission occurs: 95.1% attributed spread to the bite of a mosquito while 4.9% attributed it to dirty water and/or blood. Many studies have shown that usually, respondents are able to cite the symptoms of malaria[8,10]. Concerning the symptoms, fever was the most cited symptom of malaria (71.1%). Other symptoms cited were headaches (43.5%), vomiting(37.1%), sweating (26.4%), lack of appetite(25.8%), diarrhea 7.7%, shivering 24.7%, convulsion 15.7% and stiffness(9.3%).

Routine response upon malarial attack

According to the respondents, 28.9% sought treatment at onset of symptoms, 29.7%, 2days after, 18,5% three days after and 23.0% more than three days after onset of symptoms. Treatment were obtained by self, at the health center or at the traditional healer as shown in table 2 below:.

Table 2: Response upon malarial attack in children

Village	Response upon malaria attack in children					
	Self-treatment		Health service		Traditionalhealer	
	N	Row N (%)	N	Row N (%)	N	Row N (%)
Bai_Manya	64	65.3	30	30.6	4	4.1
Marumba 1	5	21.7	12	52.2	6	26.1
Marumba 2	42	45.2	36	38.7	15	16.1
Pete_Bakundu	61	42.4	43	29.9	40	27.7
Total	**172**	**48.0**	**121**	**33.8**	**65**	**18.2**

It can be seen that once again, self-treatment trumps as the most common thing to do. Using antimalarial drugs or herbs for self-treatment is common practice as has been shown by our results which are similar to other studies in Cameroon and Columbia [11, 12,13]. Self-treatment is usually determined by the importance in terms of severity that the parent or guardian allocates to the symptoms. This way of treatment is however less effective and incomplete or inadequate [14]. The results in our study concerning self-treatment can be explained by the effects of poverty. Going to the doctor or the traditional healer requires spending money which is not readily available and so people would rather try to treat themselves and only resort to the other means when they have been unsuccessful. The consequences of inadequate and incomplete self-treatment can be severe as enhancing drug-resistance in malaria[15].

This study also showed that the average time-lapse before seeking for treatment was more than three days after onset of fever. This is on average what was found in other countries[16] to what was found in Kenya, This is in line with the response of self-treatment being the most likely response to a suspected malarial attack. The purchase of medication for treatment was mostly from road vendors(37.5%; see table below) and this on its own raises issues about the quality of the drug. Many campaigns have been made to discourage people from buying drugs from drug peddlers and many cases of drugs being seized as media reports have shown. However, many Cameroonians still buy drugs from the peddlers or road vendors because they sell cheaper than the pharmacies and so once again this is a consequence of poverty. It is documented[15] that malaria control medications have been liberalised and this has led to an influx of many anti-malarials in the market many of which are ineffective and also this encourages self-treatment, inappropriate prescription and poor compliance all of which propagate the emergence of drug resistance which develops more rapidly when the parasite is in the presence of suboptimal doses of the drug [15]. Other studies [12] have revealed that over 50% their participants said they bought drugs from unauthorized sources. This study reveals a lesser percentage than reported but also brings evidence that drugs are mostly bought from road-vendors than from the pharmacy or hospital.

Results on where purchases are made for drugs used for treatment of malaria are shown in figure 1 below:

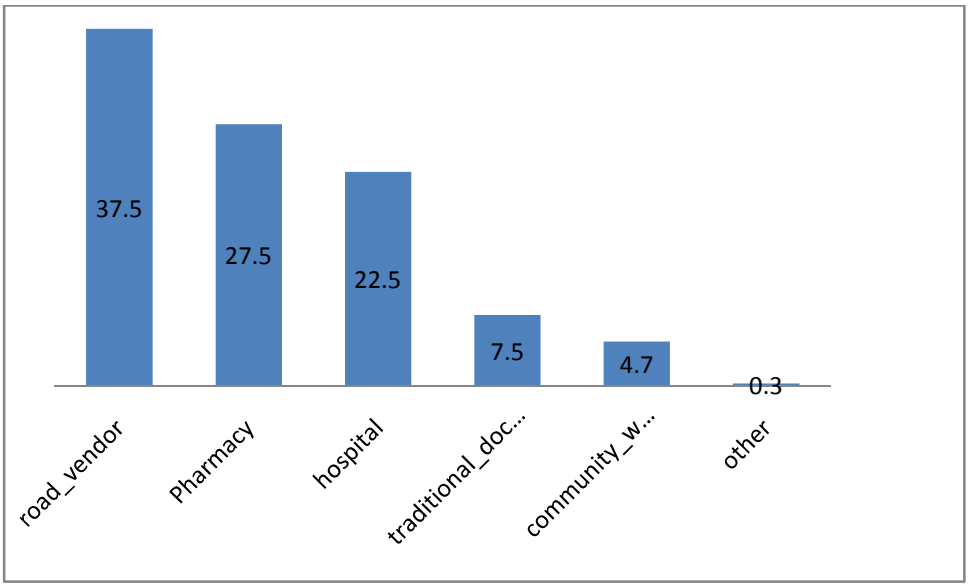

Figure I : Purchase habits for malaria medication in %

Knowledge about protection against Malaria

Table 3 : Malaria Protection Knowledge Status

Number	Method of protection	Respondents in all the village schools	Percentage (%)
1	Mosquito nets	272	76.4
2	Prophylaxis	12	3.4
3	Cutting grass around the house	51	14.3
4	Filling potholes	9	2.5
5	Use of insecticides	8	2.2
6	others	4	1.1

As can be seen from the table, the majority of respondents pointed the mosquito net as a main way of protecting against malaria. On a following question, 77.4% said they use mosquito nets to protect against malaria, 8.5% claimed to use prophylaxis, 10.2 cutting grass around the house, 3.5% said they prevented malaria by filling potholes and only 0.8% said they used insecticides. In this same study area, a previous published study [9] showed that the prevalence of parasitaemia was 50.7% in these children, a high prevalence which does not fall in line with the preventive measures allegedly followed. When asked if they knew what a mosquito net was, 98.3% responded "Yes" and when asked which kind of mosquito nets they knew, 35.4% mentioned the simple mosquito net, 25.2% insecticide impregnated mosquito net and 39.4% long-lasting insecticide impregnated mosquito net. Also, 87.8% claimed to possess a mosquito net of which 42.1% said they owned a simple mosquito net, 38.7% a long-lasting mosquito net and 19.2% insecticide-impregnated mosquito net. Most of the mosquito nets that the respondents claimed to have, were obtained as a donation(82%). This is understandable because the government of Cameroon had been on a wide-scale highly mediatised campaign to ensure that every house receives at least a mosquito net in a bid to fight against malaria[17]. Prevention against malaria in Cameroon is basically through the use of mosquito nets(insecticide treated) and indoor residual spraying[15]. The problem however is that possessing a mosquito net is not commensurate to knowing how to use it and this can be seen also in this study. There is an imbalance with the number of children having a mosquito net and the number seen still positive for parasitaemia. It is important therefore that proper training be given as to the effective installation and use of mosquito nets.

As mentioned above, Cameroon's response to malaria prevention is through the use of insecticide treated mosquito nets and indoor residual spraying[15, 18]. In order that this be effectively implemented we sought out to find out the perceptions about mosquito nets from the respondents. Very few(0.8%) respondents recognised residual spraying as a method of prevention. This shows the need to educate the kids and improve their knowledge on preventive measures. According to the responses obtained, the advantages as observed by the respondents can encourage the use of mosquito nets. However, the disadvantages mentioned are also likely to prevent the use or effective use of the mosquito nets belittling the point of its distribution in the first place. The responses can be seen in tables 4 and 5 below. The results obtained differ what was obtained from a study carried out in Ethiopia and Nigeria which aimed at finding out the determinants which will propagate the use of mosquito nets[19, 20].In both studies, costs and fear of the chemicals impregnated in the nets was a real issue which determined use while in our study, physical discomfort associated with the use of the mosquito nets were more likely to prevent it use. This is understandable because most of the mosquito nets in our study population were obtained through donations making price not to be an issue. Also our study population being slightly younger than in the other studies would make them less aware of effects of chemicals. Our results showed a high knowledge of the advantages of using a mosquito net with 61% saying it would prevent malaria. Also 56.4% said they felt a lot of heat when using mosquito nets and mentioned this as a reason why they would not use it(table 5 below). The high number of respondents possessing mosquito nets indicates that the strategy of giving free mosquito nets is an effective way of achieving widespread coverage. Emphasis should be made now on the proper and consistent use to ensure success in the campaign against malaria. Though 87.8% of the respondents claimed to have a mosquito net, only 71% of these acknowledged sleeping in the mosquito net.

Advantages of mosquito nets

Treated mosquito nets are now widely used in many countries as a way to prevent malaria and pose little or no health hazard to the users[21]. Many people realise the importance of mosquito nets and this study revealed 61.2% responded that it will protect them from malaria. Other studies have shown that bed nets are capable of reducing child mortality from malaria when properly used[21].However, these nets have to be treated with insecticide for it to be most effective[19] even though mosquito nets whether impregnated or not and in good condition are capable of preventing mosquito bites and thus reduce the incidence of malaria[21]. Our study showed that for those who said they had mosquito nets, 57.9% had insecticide impregnated mosquito nets and 42.1% had non-impregnated mosquito nets.

Table 4 : Advantages of mosquito nets as per the respondents.

No.	Advantage	Respondents in all the villages schools	Percentages(%)
1	Protection against malaria	219	61.2
2	Protection against mosquito bites	103	28.8
3	Protection against disturbances	20	5.6
4	Protection against disease	16	4.4

Inconveniences of mosquito nets:

Mosquito nets are great at preventing the bites of mosquitoes and this can reduce the number of people who fall sick because of malaria. However, there are some inconveniences associated with its use and people have to outweigh these inconveniences against the beneficial aspects of it in order to continue using it. The table below shows that

inconveniences listed by the respondents as per mosquito nets. Unlike other studies[19, 20], price was not the main inconvenience but heat associated with its use. It is important to note that some respondents considered mosquito nets to be useless.

Table 5: Inconveniences of mosquito nets according to respondents

No.	Inconvenience	Respondents in all the village schools	Percentage (%)
1	Price	37	10.3
2	Heat	202	56.4
3	Suffocating	55	15.4
4	Inefficient	34	9.5
5	Useless	11	3.1
6	Hard to maintain	19	5.3

CONCLUSION

The results of this study have revealed the knowledge that children have with respect to malaria. It has shown that the children are aware of what malaria is and the ways in which malaria can be transmitted. The evidence obtained in this study present a baseline knowledge status and identifies loop holes in knowledge concerning the dangers of malaria and therefore indicates where emphasis should be laid with respect to correcting the knowledge and filling the gaps identified in the children's knowledge. Most studies interested in the knowledge people have about malaria target the guardians and parents. This study is innovative in seeking this knowledge from children themselves who suffer the greatest burden of malaria. However this is both a strong point and a shortcoming of this study because, some of the questions may have been better answered by the parents. That notwithstanding, we believe that by equipping children with appropriate knowledge on various aspects of malaria such as prevention strategies, they are being empowered to maintain their health by using the strategies they have learned about. It is recommended however that a similar study be carried out with the parents and guardians of the respondents to cross the information obtained in this study against the knowledge of the parents. This in a bid to have all hands on deck to effectively fight against malaria.

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