

# Original Research Article

## Assessment Of Knowledge and Attitude Regarding Risk Factors of Malaria Among Caregivers of Under-Five Children in the Buea Health District, South West Region, Cameroon.

### ABSTRACT

**Aims:** The study measured the level of knowledge and attitudes towards malaria and examined associated factors among caregivers of under-five children.

**Study design:** The study was community-based, descriptive cross-sectional

**Place and Duration of Study:** The study was carried out in Buea Health District (BHD) from February to June 2020.

**Methodology:** Data were obtained through face-to-face interviews with the caregivers of under-fives. The above mean scores were used to determine the level of knowledge. The attitude levels were measured by using 3-point Likert scales. Univariate and multivariate logistic regression analyses were performed to identify risk factors associated with knowledge and attitude. SPSS software version 20.0 was used for analysis.

**Results:** Out of the 390 respondents, 69.5% of them had a neutral attitude. Meanwhile, 27.7 % of participants carried a favorable attitude towards malaria (Figure 1) and only 2.8 % of them had an unfavorable attitude. Caregivers of under-five children who scored below the mean score were 25.1 % (98/390) which was considered having poor knowledge and above the mean score was 74.9% (292/390) which was considered good knowledge. In the multivariable logistic analysis, married 's caregivers were 8.383 times (AOR = 8.383, CI = 2.561-2.744) times more likely to have better knowledge as compared to the widow. Meanwhile, being a civil servant had 45424604.837 times (AOR = 45424604.837 (95%CI= 13733820.020-150241864.364)), the housewife had 48583353.953 times (AOR = 48583353.953 (OR=48583353.95395%CI (.15690764.270-150428764.379)) more likely to have a neutral attitude towards malaria in comparison to caregivers with an unfavorable attitude.

**Conclusion:** Caregivers of under-fives displayed a good knowledge of malaria risk factors. However, in these endemic areas for malaria, caregiver attitude was found to be unenthusiastic and unresponsive, and this poses additional challenges in reaching the malaria elimination goal. Thus, suggesting that educational messages during the campaign should be contextual to reach out to local communities to trigger a positive behavioural change.

**Keywords:** Caregivers, malaria, knowledge, attitude, and under-five children

### 1. INTRODUCTION

Malaria remains a scourge to the socio-economic development of sub-Saharan African countries. In 2019, there were an estimated 228 million cases of malaria worldwide which

9 resulted in 409 000 deaths [1]. Approximately, 3.3 billion individuals are at the highest risk of  
10 acquiring malaria in the WHO Africa region. Children less than 5 years of age and pregnant  
11 women are the most vulnerable groups affected by the disease [2]. In 2018, under-five  
12 children accounted for 67% (272 000) of all malaria death worldwide [1] thus, the disease  
13 remains a major killer of children, taking the life of a child every 2 minutes [3]. In Africa,  
14 about 285 000 children died before their fifth birthdays in 2016. Globally, an estimated 1.5  
15 billion malaria cases and 7.6 million malaria deaths have been averted in the period 2000–  
16 2019. This was a period of unprecedented success in malaria control that helped shape the  
17 global response to the disease over the last 2 decades [1].

18 Cameroon has an estimated 3% of all global malaria cases in 2018, with 18 million people  
19 (about over 90% of the population) being at risk of the infection. Cameroon has initiated  
20 measures to achieve malaria elimination through, early diagnosis, artemisinin-based  
21 combination(ACT) therapies at a subsidized cost for first-line treatment for uncomplicated  
22 malaria cases, intermittent preventive therapy with sulphadoxine-pyrimethamine (SP) for  
23 expectant mothers, free distribution of LLITNs(Long Lasting Insecticide Treated Nets) to  
24 pregnant women and children under-five children and the subsidizing of the cost of LLITNs  
25 for other people [4]. Besides, diagnosis and treatment are free for under-five children with  
26 severe and uncomplicated malaria. Because the Far North and North Regions of Cameroon  
27 have a disproportionately higher number of malaria cases and deaths compared to the other  
28 Regions, the NMCC (National Malaria Control Committee) and its partners are now  
29 implementing seasonal malaria chemotherapy (SMC) in the aforementioned regions of the  
30 country [1]. As a result of all these efforts, the number of cases fell by 3% from 254 to 245  
31 per 1000 of the population at risk. Likewise, the mortality rates also fell by 16% between  
32 2015 to 2018 from 0.53 to 0.44 per 1000 of the population at risk [5].

33 Despite the considerable reduction in the prevalence of malaria in under-fives [6], the  
34 disease is still responsible for 26% of consultations, 46% of hospital admissions, and 53% of  
35 deaths among under-five children in Cameroon [7]. For instance, the study by Chiabi [8]  
36 revealed a significant burden of severe malaria (26.10%) among children at the Yaoundé  
37 Gynaeco-Obstetric and Pediatric hospital. Children under-fives are more predisposed to  
38 severe malaria due to their immature immune systems.

39 Home management of malaria is one of the cornerstones of malaria case management that  
40 falls within the frameworks of Roll Back Malaria (RBM) [9]. The RBM strategy aims to  
41 increase the capacity of caregivers to recognize malaria illness promptly and take early  
42 appropriate action. As recommended by the World Health Organization, one of the core tools  
43 of malaria control programs is training in the community health workers capable of managing  
44 uncomplicated malaria cases and providing adequate advice to families, thus, the success of  
45 such interventions depends largely on the knowledge and attitude of caregivers of young  
46 children regarding the disease. A delay inappropriate health-seeking from the onset of  
47 symptoms of uncomplicated malaria in an under-five child may lead to severity of the  
48 disease with an increased possibility of fatality [10]. For instance, home management of  
49 fever has significantly contributed to the decrease of malaria prevalence and related  
50 mortality among under-five children in Burkina Faso and Nigeria by providing suitable and  
51 efficacious care of under-five children in these endemic areas of malaria [11,12]. Caregivers  
52 of under-fives must recognize early symptoms of malaria, more importantly fever, and  
53 consequently seek medical care, to obtain and use recommended drugs appropriately [14].  
54 This recognition, in the background of home malaria management (HMM) has become one  
55 of the key strategies to achieve malaria elimination targets [15].

56 Caregivers 'adequate knowledge of malaria treatment, prevention, and transmission  
57 measures is essential to interrupt the cycle of transmission. Lacking knowledge on malaria  
58 treatment guidelines, preventive measures and inappropriate use of antimalarial drugs have  
59 been reported from Cameroon [16].

60 However, information concerning caregivers' knowledge about childhood malaria is scarce in  
61 Cameroon. The study set out to describe the knowledge and attitude of caregivers regarding

preventive measures, use of antimalarials, and treatment of children with malaria in BHD. Therefore, the study could contribute to understanding treatment-seeking behaviors that are relevant to formulate malaria control policies targeted at caregivers of under-five children.

## 2. MATERIAL AND METHODS

### Study area

#### *Buea health district*

Buea is the capital of the South West Region of Cameroon. Buea Health District is made up of both rural and urban communities with a population of 133,092 inhabitants [17].

### Study population

The study population comprised caregivers of children aged 6–59 months in the 5 selected health areas in the BHD namely Buea road, Molyko, Bokwongo, Muea, and Buea town.

### Study design

A community-based, descriptive cross-sectional study was carried out from February to June 2020. A structured questionnaire was used to collect data on caregivers' knowledge and attitude towards malaria in under-five children.

### Sample size determination

The sample size was determined using the formula for estimating a single population [18].  $N = Z^2pq/e^2$  Sample size calculation was based on the prevalence of 58.2% of households that have proper knowledge about malaria recorded in Areka Town, Southern Ethiopia [30]. where  $n$  is the sample size required,  $z=1.96$  is the confidence level test statistic at the desired level of significance,  $p=95\%$  confidence level, and considering a 5% marginal error. and 10% adjustment for non-response rate. The required sample size was 412.

### Sampling technique

A simple random sampling technique was used to select 5 out of the 7 health areas that made up the Buea Health District. In each randomly selected health area, households with at least an under-five child were visited. The procedure that was used to select each household was as follows; members of each research team stood at the junction or roundabout of the community and spin a bottle, the direction of the head was chosen. Each household with an under-five child was visited. In cases where the target was not met, the team returns to the roundabout and take the opposite direction following the same technique until the target for the community was met. To have the sample population of each selected health area, a probability proportionate to size calculation was performed [20].

### Operational Definition

Knowledge: In this study, knowledge refers to the correct responses obtained from mothers/caregivers of under-five children on the causative agent and route of transmission of malaria

Attitude: It refers to the way of thinking, acting, and behaving towards risk factors of malaria by respondents

Risk factors of malaria: It refers to particular habits, behaviors, circumstances, or conditions that increase a person's risk of getting malaria.

### Data Collection Tools

The tools developed and used for data collection were pre-tested structured questionnaire and Likert scale. The structured questionnaire was used to collect socio-demographic data and knowledge regarding risk factors of malaria while the Likert scale was used to assess the caregivers of under-five children's attitudes regarding risk factors of malaria.

### Questionnaire administration

A total of 420 questionnaires were prepared in English, pre-tested to determine its clarity and comprehension before use. The questionnaire was administered through the face-to-face interview by the research team assisted by the Nurses from the Antenatal Department of the health areas. However, those that could not express themselves in French and English

languages were interviewed in Pidgin (Local English). Respondents included in the study were mothers or caregivers of under-five children.

#### **Assessment of malaria knowledge**

Regarding caregivers' knowledge of malaria, a knowledge Score was adopted allowing for categorizing respondents as poor or good knowledge. These included caregivers' correct knowledge on malarial transmission, disease symptoms, prevention, and use of LLITNs. To achieve a maximum score the respondents had to know that malaria is transmitted by a mosquito (1 point), could cause symptoms such as fever (1 point), as well as headache, body pains, vomiting, anemia, or convulsions each (1 point). The respondent also needed to know that LLITNs could be used to prevent malaria (1 point), as well as indoor spraying (1 point), chemotherapy (1 point), and mosquito coil (1 point). Altogether, the highest possible score was 9 points. Participants who obtained a total attitude score above  $\geq 5$  were categorized as "good knowledge" while those with a total attitude score  $< 5$  were classified as "poor knowledge" [21].

#### **Assessment of malaria Attitude**

Concerning attitude, the tool which consisted of a scale was made up of 10 questions. The attitude was assessed by a 3-point Likert scale and each of these items was equally scored; response options ranged (1= never; 2= sometimes; 3= always). The attitude was arbitrarily classified as favorable attitude, Neutral and unfavorable [22].

#### **Statistical Analysis.**

Once recorded, the data were entered into an Excel database and exported to SPSS 20.0 for analysis (SPSS Inc., Chicago, IL, USA). Simple frequencies and proportions were used to describe the socio-demographic and the Chi-square ( $\chi^2$ ) test was used to test the association between knowledge and attitude and the socio-demographic factors. Logistic regression models were used to identify factors associated with caregivers' knowledge of malaria such as mode of transmission, causative agent, and their attitude towards the disease. The differences were considered to be statistically significant when the P-value obtained was less than 0.05.

### **3. RESULTS**

#### **Socio-demographic characteristics of the caregivers of under-five children**

Out of the 420 questionnaires administered, only 390 were valid (properly completed), thus making the response rate of 92.8%. Table 1 provides a summary of the characteristics of the caregivers of under-five children. More than half of caregivers were aged 20-29 years 56.4% (220 /390), predominantly practice Christianity 93.6% (365/390) and were self-employed 30% (117/390). As regards the type of house, participants in their majority reside in block or cemented houses 82.3% (313/390). Aside from this, the vast majority of them had an average family size of 3 children 79.0% (308/390). Regarding sources of information related to malaria, their main sources were health workers 94.6 % (369/390) and television 74.1% (289/390).

**Table 1. Socio-demographic characteristics of respondents**

Variable	Category	Number(n)	Frequency (%)
Age group (years)	20-29 years	220	56.4
	30-39 years	130	33.3
	40-49 years	36	9.2
	$\geq 50$	4	1.0
Religion	Christian	365	93.6
	Muslim	25	5.2
Marital status	Married	203	52.1

	Single parent	92	23.6
	Co-habiting	75	19.2
	Divorced	15	3.8
	Widow	5	1.3
Educational level	Secondary School	97	24.9
	High School	88	22.6
	Primary School	44	11.3
	No formal education	2	.5
Occupation	University	106	27.2
	Vocational	53	13.6
	Training		
	Unemployed	76	19.5
	Business	106	27.2
	Civil servant	25	6.4
	House Wife	35	9.0
House type	Self-employed	117	30.0
	Private sector	31	7.9
	Block	313	80.3
Number of children	Plank	77	19.7
	1-3	308	79.0
Source of information	4-7	82	21.0
	Husband	140	35.9
	Friends	256	65.6
	Television	289	74.1
	Health Workers	369	94.6
	Information leaflet	260	66.7
	Radio station	267	68.5

### Malaria Knowledge Score

The mean score of the participant's knowledge was 4.5. Caregivers of under-five children who scored below the mean score were 25.1 % (98/390) which was considered poor attitude and above the mean score was 74.9% (292/390) which was considered good attitude.

### Attitude of caregivers of under-five children towards malaria

In the present study, the means were significant when ranging from 1-1.67 meaning unfavorable attitude. From 1.67 to 2.33, it means neutral while from 2.33 to 3.00, it means a favorable attitude. The attitudes of caregivers of under-five children towards malaria risk are presented in Table 2. which revealed that the mean score of item 'the use of LLITNs' (mean =2.63) ranked the highest followed by 'Good personal hygiene (Mean=2.45). The least mean score for the items 'mosquito coil' (mean =1.71)' and 'Hand killing of mosquitoes' (mean =1.81).

**Table 2. Descriptive statistics on the caregivers of under-five children attitude towards malaria**

Statements	N	Minimum	Maximum	Mean	Std. Deviation
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LLITNs	390	1	3	2.63	.515
IRS	390	1	3	2.02	.573
Prompt treatment	390	1	3	2.33	.587
Mosquito coil	390	1	3	1.71	.665
Good personal hygiene	390	1	3	2.45	.646
Healthy diet	390	1	3	2.01	.706
Keeping windows and doors closed	390	1	3	2.15	.546
Chemotherapy	390	1	3	2.29	.567
Hand killing of mosquitoes	390	1	3	1.81	.688
How often the under 5 child sleeps under LLITN	390	1	3	2.41	.688
Valid N (listwise)	390				

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### Overall Attitude Score

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The maximum attitude score is determined for each caregiver of under-five children by adding up the scores across the 10 attitude items or questions. the right answer scored 3 points and the wrong answer 1 point following the Likert scale. Out of the 390 respondents, the majority of caregivers had a neutral attitude 69.5%. Meanwhile, 27.7 % of participants carried a favorable attitude (Table 3) and only 2.8 % of them had an unfavorable attitude regarding risk factors of malaria.

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### Distributions of respondent's attitude towards malaria

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The proportion of caregivers of under-five children that had a neutral attitude towards malaria were highest on the age group 30-39 years 76.9% (100/130), business 77.4% (82/106), with a primary level of education 75% (33/44) and married 85.2% (137/203) as depicted in table 2.

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**Table 3. Frequency distributions of respondents of attitude towards malaria**

Characteristics	Attitude level n(%)		
	Unfavorable	Neutral	Favorable
<b>Age group</b>			
20-29 years	4(1.8)	141(64.1)	75(34.1)
30-39 years	5(3.8)	100(76.9)	25(19.2)
40-49 years	2(5.5)	27(75)	7(19.4)
≥50	0(0.0)	3(75)	1(25)
<b>Occupation</b>			
Unemployed	1(1.3)	50(65.8)	25(32.9)
Business	5(4.7)	82(77.4)	19(17.9)
Civil servant	0(0.0)	14(56)	11(44)
House Wife	0(0.0)	22(62.8)	13(37.2)
Self employed	3(2.6)	80(63.4)	34(29.0)
Private sector	2(6.4)	23(74.2)	6(19.3)
<b>Educational level</b>			
Secondary School	3(3.1)	67(69.1)	27(27.8)
High School	5(5.7)	57(54.8)	26(29.57)
Primary School	0(0.0)	33(75)	11(25)

No formal education	0(0.0)	1(50)	1(50)
University	1(0.9)	74(69.8)	31(29.2)
Vocational Training	2(3.7)	39(73.6)	12(22.6)
<b>Marital status</b>			
Married	6(2.9)	137(85.2)	60(29.5)
Single parent	1(1.1)	63(68.5)	28(30.4)
Co-habiting	3(4)	55(7.3)	17(26.7)
Divorced	1(6.6)	12(80.0)	2(1.3)
Widow	0(0.0)	4(80.0)	1(20.0)
<b>Number of children</b>			
1-3	9(2.9)	206(66.8)	93(30.2)
4-7	2(2.4)	65(79.3)	15(18.3)
<b>Religion</b>			
Christian	10(3.7)	252(69.1)	103(28.5)
Muslim	1(4.0)	19(76.0)	5(20.0)
<b>House type</b>			
Block	11(3.5)	216(69.0)	86(27.5)
Plank	0(0.0)	55(71.4)	22(28.6)
<b>Total</b>	11(2.8)	271(69.5)	108(27.7)

#### Analysis of factors associated with malaria knowledge score

The univariate analyses showed evidence for negative associations between age group (years), number of children and house type, and level of knowledge of malaria risk. Multiple logistic regression analysis was performed to identify factors associated with caregivers of under-five knowledge of malaria. Participants' levels of education, marital status, and religion were found to have significant associations. In that regard, married 's caregivers were 8.383 times (AOR = 8.383, CI = 2.561-2.744) times more likely of receiving a high malaria knowledge score as compared to windows (Table 4).

**Table 4. Univariate and multivariate analysis of factors associated with malaria knowledge score**

Characteristics	Level of knowledge		COR	95%CI	P-value	AOR	95%CI	P-value
	Good n(%)	Poor n(%)						
Age group (years)								
20-29	163(74.1)	57(25.9)	1.049170	-2.235-2.331	.967	.953	.097-9.349	.697
30-39	96(73.8)	34(26.2)	1.062898	-2.236-2.357	.959	.941	.095-9.357	.959
40-49	30(83.3)	6(16.7)	.59989	-2.938-1.916	.680	1.667	.147-18.87	.680
≥50	3(75)	1(25)						
Religion								
Christian	275(75.4)	90(24.6)	.695586	-1.237-.510	.415	1.438	.600-3.444	.415
Muslim	17(58)	8(32)						
Occupation								
Unemployed	58(76.3)	18(23.7)	.892257	-1.077-.849	.816	1.121	.428-2.935	.816
Business	80(75.5)	26(24.5)	.934260	-.986-	.885	1.070	.427-2.681	.885



				.850				
Civil servants	18(75)	6(25)	1.118512	-1.076- 1.299	.854	.894	.273-2.932	.854
House wife	26(74.2)	9(25.7)	.995012	-1.110- 1.101	.993	1.005	.333-3.035	.993
Self employed	87(74.4)	30(25.6)	.991040	-.914- .897	.985	1.009	.408-2.494	.985
Employed in the private sector	23(72)	8(25)	1(3.1)					
House type								
Block	238(76.8)	72(23.2)	4.09	.809- .2.452	.227	1.408	.809-2.452	.227
Plank	54(70.2)	23(29.8)						
Educational level								
Secondary School	76(78.4)	21(21.6)	1.18767	-.668- 1.013	.688	8.383E- -9	2.744- 2.561	.001
High School	61(69.3)	27(30.7)	1.90408	-.180- 1.467	.126	1.016E- -8	3.136- 3.292	.001
Primary School	25(56.8)	19(43.2)	3.267417	.274- 2.095	.011	1.277E- -8	3.796- 4.299	.001
No formal education	2(100.0)	0(0.0)	1.3726E- 08	-.18.1- 18.1		6.387E- -9	6.387- 6.387	.001
University	85(80.5)	21(19.8)	1.061836	-.777- .898	.887			.001
Vocational Training	43(81.1)	10(18.9)						
Marital status								
Married	147(72.4)	56(27.6)	11928188	17.4- 19.71	.000 1	8.383	2.561- 2.744	.001
Single parent	70(76.1)	22(23.9)	98444155	17.229- .9	.000 1	1.016E- -8	3.292E-8- 3.136E-9	.001
Co-habiting	60(80)	15(20)	78295446	16.962- .1	.000 1	1.277E- -8	4.299E-8- 3.796E-9	.001
Divorced	10(66.7)	5(33.3)	15656784	18.869- 18.869	.000 1	6.387E- -9	6.387E-9- 6.387E-9	
Widow	5	0						
Number of children								
1-3	230(74.7)	78(25.3)	2.69	.881- 1.112	.862	.951	1.675	.862
4-7	62(73.2)	20(26.8)	2.82	.664- 1.630				

Factors associated with caregiver's attitude level towards malaria risk were educational level and marital status which showed significant associations in the univariate analysis. In the multivariable logistic regression analysis, being a civil servant had 45424604.837 times (45424604.837 (95%CI 13733820.020-150241864.364)), the housewife had 48583353.953 times (48583353.953 (95%CI 48583353.953 (.15690764.270-150428764.379)) more likely to have a neutral attitude towards malaria compared to caregivers with unfavorable attitude (Table 5). The attitude towards malaria risk factors was also significantly associated with poorly constructed houses and with open eaves such as plank houses. The odds of having a



213 favorable attitude towards malaria were eight times higher if the child with a caregiver in the  
 214 house block (OR 8.406, (95% CI 8.406-88.406) .0001).

215 **Table 5: Association between caregiver's attitude and socio-demographic**  
 216 **characteristics**

Variables	Univariate Analysis n (%)	COR (95%CI) p-value	Unfavorable	Multivariate analysis	
				Neutral AOR (95%CI) p value	Favorable
Age group (years)					
20-29	220(56.4)	1.41 (-1.815-2.492) .758		3.976E-7 (2.125E-8-7.438E-6) .001	6.344E-7 (9.819E-8-4.099E-6) .001
30-39	130(33.3)	0.65(-2.605-1.743) .698		2.256E-7 (1.244E-8-4.091E-6) .001	1.692E-7(2.683E-8-1.067E-6)<.0001
40-49	36(9.2)	0.61(-2.771-1.776) .668		1.523E-7 (1.366E-8-1.697E-6) .001	1.184E-7(1.184E-7-1.84E-7
≥50	4(1.0)				
Occupation					
Unemployed	76(19.5)	2.34(-.120-1.823).086		4.348 (.375-50.420).240	8.333 (107.851-.644) .105
Business	106(27.2)	1.00(-.958-.966) .994		1.426 (.260-7.8367.836) .683	1.267 (8.295-.193) .805
Civil servant	25(6.4)	3.78 (.174-2.490) .024		45424604.837(13733820.020-150241864.364) <.001	136814583.617 (9136814583.617 -1336814583.617)
House Wife	35(9.0)	2.89 (-.025-2.148) .056		48583353.953 (.15690764.270-150428764.379) <.001	110048657.817 (110048657.817-110048657.817)
Self employed	117(30.0)	1.91 (-.289-1.580) .176		2.319 (.365-14.723).372	3.778 (27.597-.517).190
Private sector	31(7.9)				
Educational level					
Secondary School	97(24.9)	1.29 (-.507-1.029).505		1.145 (.183-7.156) .885	1.500 (.221-10.171) .678
High School	88(22.6)	1.189 (-.646-.992).678		.585 (.108-3.167) .533	.867 (.147-5.123) .875
Primary School	44(11.3)	2.86 (.399-1.704).002		33597028.825 (13119385.622-86037591.879) <.001	36396781.227 (36396781.227-36396781.227
No formal education	2(0.5)	3.42 (.434-2.024).002		25587334.077 (1485538.540-440723446.543) <.001	83158835.751 (83158835.751-83158835.751
University	106(27.2)	1.67 (-.207-1.239).162		3.795 (.334-43.174) .282	5.167 (.428-62.393) .196
Vocational	53(13.6)				

training				
Marital status				
Married	203(52.1)	.023 (-7.738-.164).060	8.755E-8 (3.067E-9-2.499E-6) <.001	1.534E-7 (1.206E-8-1.950E-6) <.001
Single parent	92(23.6)	0.07 (-6.541-1.269).186	2.416E-7 (5.385E-9-1.084E-5) <.001	4.295E-7 (1.894E-8-9.736E-6) <.001
Co-habiting	75(19.2)	0.003 (-11.263--.435).034	7.030E-8 (2.228E-9-2.218E-6) <.001	8.691E-8 (5.864E-9-1.288E-6) <.001
Divorced	15(3.8)	8.4 (-18.240-.542).038	4.601E-8 (3.239E-9-6.538E-7) <.001	3.068E-8 (3.068E-8-3.068E-8) <.001
Widow	5(1.3)			
Number of children				
1-3	308(79.0)	1.6 (-1.123-1.114).116	.704 (.148-3.343) .659	1.378 (.271-7.006) .699
4-7	82(21.0)			
Religion				
Christian	365(93.6)	1.6 (-.494-1.379) .354	1.326 (.161-10.916) .793	2.060 (.219-19.409) .528
Muslim	25(6.4)			
House type				
Block	310(80.1)	1.2 (-.713-.350) .503	8.606E-8 (4.940-1.499) .0001	8.406 (8.406-88.406) .0001
Plank	77(19.9)			

## DISCUSSION

Proper understanding of caregivers of under-five children's knowledge and attitude about malaria transmission, prevention, and control holds the key to the success of a control program aiming at the reduction in malaria morbidity and mortality in under-five children [21]. The present study provides up-date information about the level of malaria knowledge and attitude among caregivers of under-five children in the BHD. The overall knowledge of malaria among caregivers of under-five children was found to be adequate (74.9%). These findings are similar to a recent study, conducted in Douala (Cameroon) which showed that of 2507 employees surveyed, 90.7% of the respondents knew that mosquitoes were vectors that transmit malaria [23]. Also, Our findings of the high level of knowledge concord with previous studies in Cameroon [24]. However, there are still lower than observed by jumbam [25] in Zambia where 91%, of participants, reported that malaria could be transmitted by the bite of an infected female anopheline mosquito. The level of knowledge in the present study may be attributed to the positive effects of the periodic distribution of LLITNs have been going on since 2012 and the implemented a national malaria communication campaign under a unified brand, the "KO Palu" (Knock Out Malaria). The upgraded knowledge of caregivers of under-fives concerning malaria might also be attributed to the fact that in Cameroon, about 90 % of pregnant women receive the first dose of SP, while about 64 % take the complete dose [26] following WHO recommendations of at least three free SP doses between the 16th and the 36th weeks of pregnancy alongside the use of ITNs have been implemented in Cameroon [27]. ANC is the platform where these interventions are delivered alongside talks about malaria knowledge.

Despite sufficient knowledge of malaria risk factors, the behavioral attitude of caregivers of under-fives was quite unsatisfactory. Caregivers of under-fives showed an unenthusiastic attitude towards malaria risk. One of the many decisions made by caregivers which had consequences on family wellbeing, were prompt treatment and the use of chemotherapy. As revealed in this study, the majority of caregivers do not see anything wrong with delayed treatment and the non-use of chemotherapy at the onset of symptoms in their under-five children. WHO and UNICEF have recommended the need to strengthen the family's ability to identify danger signs and prompt care-seeking to curb the childhood illnesses [28].

Our findings showed that, one-third of the caregivers of under-fives have a neutral attitude towards malaria risk factors. However, this report contradicts that of Fuge [29] where more than half of the pregnant participants showed a positive attitude towards the severity of malaria and its prevention methods like sleeping under bed nets as well as its threat on under-five children. Also, Runsewe-Abiodun [30] reported a 30% positive attitude towards malaria in South-West Nigeria while Pyae [31] pointed out that among the respondents living in the malaria-endemic area of Myanmar, more than half (56.8 percent) had a good level of attitude.

Overall, assessing the comprehensive attitude level of caregivers, the present study revealed that 69.5% of caregivers had a neutral attitude and only 27.7% had a favorable attitude, contrasting with the findings of Kebede [32] where 55.1% of respondents had a positive attitude and 44.9% had a negative attitude towards malaria. Likewise, in another study from Southern Ethiopia, they found out that, slightly more than half of the respondents (51.1%) had a positive attitude towards malaria [33]. Community members' attitude towards malaria as a disease is important in understanding their health-seeking behavior and their adoption of preventive methods. Several studies have indicated that some communities do regard malaria as a dangerous disease that can kill and affects more children under-fives than the adults. Such positive attitudes are essential opportunities for behavior change campaigns.

The correct response about the use of LLITNs in this study was remarkable. Similar values were reported by other studies in Cameroon [34] but contrast with the report by Taremwa Southwestern Uganda [35] where the high rate of LLITNs possession and good knowledge did not translate into overwhelming usage and this impact negatively on the prevention of malaria among vulnerable populations. The use of LLITNs has not only remained one of the most important of all measures of protection against malaria and when used properly, but its efficacy in reducing maternal anaemia, placental infection, and low birth weight has also been reported. LLITNs.

The misconception was still widespread among caregivers in spite of the high level of malaria knowledge. The misconception of caregivers regarding the mode of transmission of malaria such as good personal hygiene (mean= 2.41) was significant. These findings reflect outcomes from a study in rural Zambia [25]. The possible explanation for the misconceptions displayed by caregivers of under-fives about the transmission and control means could be attributed to the attention they gave for personal hygiene and the misinterpretation of messages conveyed by community health workers and nurses during ANC.

Based on the results of this study, the socio-economic factors closely related to the risk of malaria were the level of education, marital status, and religion. These were expected findings because, with increasing age and level of education thus, the level of knowledge increases. These findings are in agreement with reports by Isah [34]. For instance, according to the study conducted in Areka Town, Southern Ethiopia, households whose heads attain the educational level of college and above were 6 times more likely to have good knowledge of malaria as compared to their counterparts with no formal education [35].

The odds of having a favorable attitude towards malaria were more than eight times lower if the child is living with a caregiver in the blockhouse. This finding was in line with the study carried out in North-western Tanzania, [36] where Mosha found out that the odds of malaria infection were lower with living in the block, with closed eaves, use of LLINs. These types of

house construction likely prevent mosquitoes to enter the house and bite [37], and thus, offer more protection compared to those made of planks with open eaves and holes that provide resting places for mosquitoes.

#### 4. CONCLUSION

Caregivers of under-fives displayed a good knowledge of malaria risk factors. However, in these endemic areas for malaria, caregiver attitude was found to be unenthusiastic and unresponsive, thus posing additional challenges in reaching the malaria elimination goal. Thus, it is suggested that educational messages during the campaign should be contextual to reach out to local communities to trigger a positive behavioral change.

#### ETHICAL APPROVAL

The study was approved by the Institutional Review Board of the University of Buea (No CEI-UD/377/01/2015/M). An administrative authorization was obtained from the Regional Delegation of Public Health, South West Region (R11/ MINSANTE/ SWR/ RDPH/ PS/ 535/ 751). Study subjects were provided information about the purposes and objectives of the study. Before data collection and written informed consent was obtained from voluntary participants during data collection. The respondents were assured of their right to withdraw from the interview at any time they would wish during the exercise. All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki."

#### REFERENCES

1. WHO: World malaria report 2020: 20 years of global progress and challenges Geneva; 2020. s (<https://www.who.int/teams/global-malaria-programme>).
2. WHO: Protecting vulnerable groups in malaria-endemic areas in Africa through accelerated deployment of insecticide-treated nets. World Health Organization publication: Geneva; 2005. WHO/Htm/RBM/2005.57. Joint Statement.
3. WHO. World Health and Organization. World malaria report 2016. Geneva, 20 Avenue Appia, 1211 Geneva 27, Switzerland; 2016.
4. Erhun WO, Agbani EO, Adesanya SO. Malaria prevention: knowledge, attitude and practice in A Southwestern Nigerian community. *Afri J Biomed I Research* 2005; (8):25–2.
5. USAI. Funding of Universal Health Couverture and Family Planning - A Multi-Regional Landscape Study and Analysis of Select West African Countries: Cameroon. 2017;
6. Yekabong RC, Ebile WA, Nde Fon P, and Asongalem EA. The impact of mass distribution of long lasting insecticide-treated bed-nets on the malaria parasite burden in the Buea Health District in South-West Cameroon: a hospital based chart review of patient's laboratory records. *BMC Res Notes*. 2017;(10): 534.
7. MSP, Bulletin Epidémiologique annuel 2018 du Paludisme au Cameroun, Ministère de la santé publique du cameroon, 2018.
8. Chiabi A, Djimafo ANM, Nguetacka S, Maha E, Dongmo FN, Fru Angwafo III. Severe malaria in Cameroon: Pattern of disease in children at the Yaounde Gynaeco-Obstetric and Pediatric hospital *J Infect Public Health*. 2020;(13): 1469–1472
9. WHO. The Roll Back Malaria strategy for improving access to treatment through home management of malaria. Geneva: WHO; 2005 pp.52 (cited 2017 Jun 01). Available from: [http://apps.who.int/iris/bitstream/10665/69057/1/WHO\\_HTM\\_MAL\\_2005.1101.pdf](http://apps.who.int/iris/bitstream/10665/69057/1/WHO_HTM_MAL_2005.1101.pdf)
10. WHO. Global Technical Strategy for Malaria 2016–2030. Geneva: World Health Organization. 2016.

11. Oreagba AI, Onajole AT, Olayemi SO, Mabadeje AFB. Knowledge of malaria amongst caregivers of young children in rural and urban communities in Southwest Nigeria. *Trop J Pharm Res.* 2004;3(1):299–304.
12. Mirzoev T, Etiaba E, Ebenso B, Uzochukwu B, Manzano A, Onwujekwe O, et al. Study protocol: realist evaluation of effectiveness and sustainability of a community health workers programme in improving maternal and child health in Nigeria. *Implement Sci.* 2016;(11):83. doi:10.1186/s13012-016-0443-1.]
14. WHO, Roll Back Malaria department: Scaling up Home-based Management of Malaria 2004
15. WHO, Roll Back Malaria Department: The Roll Back Malaria Strategy for Improving Access to Treatment: Through Home Management of Malaria 2005.
16. Sayang C, Gausseres M, Vernazza-Li N, and Malvy D, et al. Treatment of malaria from monotherapy to artemisinin-based combination therapy by health professionals in urban health facilities in Yaoundé, central province, Cameroon. *Malar J* 2009;(8): 176.
17. Kimbi HK, Nkesa SB, Ndamukong-Nyanga JL, Sumbele IUN, Atashili J. and Atanga MBS. Knowledge and perceptions towards malaria prevention among vulnerable groups in the Buea Health District, Cameroon *BMC Public Health.* 2014;(14):883
18. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J. Psychol. Med.* 2013;35 (2): 121.
19. Oguonu T, Okafor HU and Obu HA. Caregivers knowledge, attitude and practice on childhood malaria and treatment in urban and rural communities in Enugu, southeast Nigeria. *Pub Health.* 2005;(119):409-414
20. Charan J. and Biswas T. How to calculate sample size for different study designs in medical research? *Indian J. Psychol. Med.* (2013);35 (2): 121
21. Romay-Barja M, Ncogo P, Nseng G, Santana-Morales MA, Herrador Z, Berzosa P, et al. Caregivers' Malaria Knowledge, Beliefs and Attitudes, and Related Factors in the Bata District, Equatorial Guinea. *PLoS ONE.* 2016; 11(12): e0168668. doi:10.1371/journal.pone.0168668
22. Ramesh PT, and Shirya R. Assessment of Knowledge and Attitude Regarding Risk Factors of Cardiovascular Disease among General People Residing in Nepalgunj, Banke, Nepal. *Am J Pub Health Res.* 2021;(9)4: 130-141. doi: 10.12691/ajphr-9-4-2.
23. Nchetnkou CM, Kojom Foko LP, Lehman LG. Knowledge, Attitude, and Practices towards Malaria among Employees from Enterprises in the Town of Douala, Cameroon. *Hindawi BioMed Res Intl.* 2020; Article ID 8652084.
24. Kojom Foko LP and Lehman LG. Knowledge and beliefs towards malaria and associated factors among residents of the town of Douala, Cameroon, *Archives of Current Research International.* 2018;(14);3. 1–17.
25. Jumbam DT, Stevenson JC. Matoba J, Grieco JP, Ahern LN, Hamainza B. Knowledge, attitudes and practices assessment of malaria interventions in rural Zambia et al. *BMC Pub Health.* 2020;(20):216
26. Anchang-Kimbi JK, Achidi EA, Apinjoh TO, Mugri RN, Chi HF, Tata RB, et al. Antenatal care visit attendance, intermittent preventive treatment during pregnancy (IPTp) and malaria parasitaemia at delivery. *Malar J.* 2014;13:162.
27. WHO. World Malaria report 2015. Geneva: World Health Organization, 2015. <http://www.who.int/malaria/media/world-malaria-report-2015/en/>.
28. Kagabo DM, Kirk CM, Bakundukize B, HedtGauthier BL, Gupta N, Hirschhorn LR, et al. Care -seeking patterns among families that experienced under -five child mortality in rural Rwanda. *PLoS One.* 2018;(1):13
29. Fuge TG, Ayanto SY, and Gurmamo FL. Assessment of knowledge, attitude and practice about malaria and ITNs utilization among pregnant women in Shashogo District, Southern Ethiopia *Malaria J.* 2015;(14):235-
30. Runsewe-Abiodun TI, Runsewe O. Attitude and practice of pregnant women to use of insecticide treated nets in South-West Nigeria. *Afr J Pregnancy Childbirth.* 2013;(1):1–9.

- 398 31. Pyae LA, Pumpaibool T, Soe TN,, Taw NP, Kyaw MP. Knowledge, attitude and practice  
399 levels regarding malaria among people living in the malaria endemic area of Myanmar. J  
400 Health Res.2020;(34):1.22-30
- 401 32. Kebede DL, Hibstu DT, Birhanu BE and Bekele FB. Knowledge, Attitude and Practice  
402 Towards Malaria and Associated Factors in Areka Town, Southern Ethiopia: Community-  
403 Based Cross-Sectional Study. J Trop Dis 2017;(5):3
- 404 33. Terefe GF, Samuel YA, Fiseha LG. Assessment of Knowledge, Attitude and Practice  
405 about malaria and ITNs utilization among pregnant women in Shashogo District Southern  
406 Ethiopia. Malaria J. 2015;(14): 235-238.
- 407 34. Isah M. Ambe NF, Bobga, TP, Ketum AS, Ivan MK and Abungwi, M.A. Predictors of  
408 Malaria Prevalence and Coverage of Insecticide-Treated Bednets among Under-Five  
409 Children in the Buea Health District, South West Region, Cameroon. J Biosci Med. 2020;(8):  
410 25-40
- 411 35. Taremwa IM, Ashaba S, Adrama HO, Ayebazibwe C, Omoding D, Kemeza I, et al..  
412 Knowledge, attitude and behaviour towards the use of insecticide treated mosquito nets  
413 among pregnant women and children in rural Southwestern Uganda MC Public Health.  
414 2017; (17):794
- 415 36. Mosha JF, Lukole E, Charlwood JD, Wright A, Rowland M, Bullock O. Risk factors for  
416 malaria infection prevalence and household vector density between mass distribution  
417 campaigns of long-lasting insecticidal nets in North-western Tanzania. Malar J 2020;(19):297
- 418 37. Wanzirah H, Tusting LS, Arinaitwe E, Katureebe A, Maxwell K, Rek J, et al. Mind the  
419 gap: house structure and the risk of malaria in Uganda. PLoS ONE. 2015;10:e0117396.  
420