

Perceptions of Care givers of Uncomplicated Malaria and their Health Care Seeking Behavior for Children below 5-Years in Cameroon

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ABSTRACT

Background: Malaria is one of the leading causes of morbidity and mortality especially among children below 5-years. This study was conducted to bring out the knowledge, and healthcare seeking behavior of caregivers on malaria in order to determine the knowledge and treatment gaps for tailored health education and informed policy on childhood malaria management.

Materials and Methods: A cross-sectional survey was conducted using structured likert scale questionnaires to assess perceptions and healthcare seeking behavior among caregivers. The study site included fifteen health facilities in malaria endemic zones in Cameroon. The study population included care givers of children 5-years and below. The participants were 1131 caregivers randomly selected who consented to take part in the study. Data analysis were done using SPSS 26 and results recorded. Knowledge scores were compared with the overall means scores to ascertain knowledge gabs and healthcare seeking behavior.

Results: Majority of the caregivers (90.7%) demonstrated above average knowledge of malaria transmission, signs/symptoms and prevention strategies. Being an older caregiver ($X_2 = 13.504$, $P = 0.019$), having a child between 1-3-years ($X_2 = 7.885$, $P = 0.019$), dwelling in an urban setting ($X_2 = 20.359$, $P = 0.001$), having a tertiary level of education ($X_2 = 64.763$, $P = 0.001$), being employed ($X_2 = 15.995$, $P = 0.001$) and being a biological parent ($X_2 = 6.077$, $P = 0.048$) were significantly associated with correct knowledge on malaria. More than half (52.2%) of the caregivers visited the hospital immediately their children were not feeling fine. A total of 52.2% of the caregivers take their children directly to the health facility when they show signs and symptoms of malaria, total 32.1% purchase medications from local drug vendors, others do home treatment before taking their children to the hospital (53.1%), while others use herbs or visit a tradi-practitioner which may pose a threat on the health of their children.

Conclusion: The study demonstrated the availability of substantial knowledge of malaria, among caregivers of children below 5-years. Despite heightened knowledge on malaria some caregivers still seek care from unconventional sources which poses risk for complicated malaria if not treated on time. More health education on the different preventive methods and healthcare seeking behavior among caregivers is still needed to help reduce the incidence of malaria and to prevent complicated malaria among children.

Keywords: Perceptions, Caregivers, Uncomplicated malaria, Healthcare seeking, Cameroon

List of Abbreviations:

ACTs: Artemisinin-Based Combination Therapies

WHO: World Health Organization

IRS: Indoor Residual Spraying

IPT: Intermittent Preventive Treatment

LLINS: Long Lasting Insecticide Treated Bed Nets

1. Introduction

Malaria is a serious and potentially fatal disease caused by the parasite, *Plasmodium*. There are four species of this parasite which cause the disease in humans, namely, *P. falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*. These parasites are transmitted basically through the bites of female Anopheles mosquitoes¹. Malaria caused by *P. falciparum* is the deadliest form and the most predominant in Africa. The *P. vivax* is less dangerous but more widespread². Symptoms of malaria are generally nonspecific and commonly consist of fever, malaise, weakness, gastrointestinal complaints (nausea, vomiting, and diarrhoea), neurological complaints (dizziness, confusion, and coma), and myalgia³. Others include headache, chills and/or cough, back and joint pains, delirium, convulsions, and anaemia⁴.

Malaria continues to be a major public health concern in many countries of the world despite the efforts and progress made in reducing malaria cases and deaths. An estimated number of 214 million cases of malaria were recorded across the world in 2015 and this resulted in 438,000 malaria deaths, 90% of which occurred in Africa⁵. The disease burden is highest in poor, rural areas and deprived populations, contributing annually to an estimated 1.3% reduction in economic growth in high-burden countries⁶ and reduces school attendance, impairs cognitive development in children, and lowers productivity⁷.

Malaria can be effectively prevented and treated using tools that exist today⁸. A multipronged approach using long lasting insecticide treated nets (LLINs), indoor residual spraying (IRS), intermittent preventive treatment (IPT) of pregnant women and children, and prompt diagnosis and treatment using ACTs and other antimalarial agents such as quinine has been proven to prevent death and significantly reduce illness⁹. The way forward then is to improve education and sensitization of the populace, establishment of effective collaborations and the provision of the right tools, and improving access. Being largely a disease of poverty, malaria and its effects would be greatly reduced by improvement in the living conditions of the people. Others will include the adaptation of new approaches to the handling and treatment of malaria. The engagement and use of community health officers from both healthcare and social services sectors could help develop malaria plans and policies capable of providing preventive, promotional, and medical care to individuals and communities.

Malaria is unique among diseases because its roots lie so deep within human communities¹⁰. Beliefs and practices related to malaria are often associated with culture and can influence the

effectiveness of control practices¹¹. Similarly, Kimbi, et al.¹² note that the practice of malaria preventive is related to the level of knowledge and belief of people. The understanding of the possible causes, modes of transmission, and decision about adoption of preventive and control measures vary from community to community and among individual households. Nkuo-Akenji, et al.¹¹ reported that an adequate knowledge of mothers of under-fives about malaria has a great correlation with reduced morbidity and mortality among children less than five years. However, a lot of misconceptions concerning malaria still exist. Thus, local knowledge and practices related to malaria are important for the implementation of culturally appropriate, sustainable, and effective interventions¹³. Malaria cannot be controlled by the health sector alone; therefore, multiple strategies must be pursued with other health related sectors including knowledge of caregivers on malaria for children below 5-years. In view of this, Cameroon implemented interventions to help in the control of the deadly disease. Some of the interventions applied included residual insecticide application against adult mosquitoes, mass chemoprophylaxis with Pyrimethamine medicated salt, and improvement of drainage system. But malaria continued to be the leading cause of morbidity (illness) in the country¹⁴.

Delay in seeking treatment for malaria is described as when treatment is sought more than 24 h after recognition of symptoms¹⁵. To avoid complications from malaria, including the dreaded stage of severe malaria, it is important to adopt adequate treatment-seeking behaviour¹⁶, and hence shorten the time taken to seek appropriate treatment¹⁵. One of the main components of the World Health Organization's current strategy presses on the early recognition and prompt treatment of malaria¹⁷. Timely diagnosis, prompt and adequate treatment have been identified as the basis for the management of malaria and the key to reducing the burden of malaria, including its transmission¹⁷.

Government of Cameroon has taken several initiatives in the prevention of malaria and these include the free distribution of Long Lasting Insecticide Nets (LLITNs) to pregnant women and children 5-years and below, the subsidizing of the cost of to the rest of the population, the subsidizing of the cost of artemisinin-based combination therapy used as first line treatment for uncomplicated malaria cases, and training in the community of local health assistance capable of managing uncomplicated malaria cases and providing adequate advices .

Despite the measures put in place by the government and its partners, malaria still remains a public health concern, a major cause of mortality and morbidity especially in children under

five years in Cameroon¹⁸. Perceptions of caregivers on malaria and their healthcare seeking practices may influence the overall outcome of malaria in children below 5-years. Thus this study sought to examine the perceptions of caregiver's on malaria and their health seeking behaviors in some healthcare facilities most of which are located in rural communities.

2. Materials and Methods

2.1. Study site

This study was conducted in 15 health facilities in Cameroon purposively selected to cover all the different epidemiological facets that have a potential to affect malaria transmission. Most of the health facilities selected were from a rural setting whereby knowledge of malaria management may be poor. The Cameroon Baptist Convention Health Services is the country's second largest healthcare provider after the government with over 80 health facilities (hospitals, health centers and primary health centers) which are actively involved in the fight against malaria and other health conditions in the country. The CBCHS adopted the Global and National guidelines for malaria management with a central coordinating unit for malaria control and prevention linking all its health facilities rendering malaria prevention and care services for children 5-years and below. As part of program improvement 15 hospitals and primary health centers in rural and urban health districts which render malaria prevention and care services were selected as part of its program improvement under the malaria program. These fifteen (15) health facilities were purposively selected each from Bayangam, Tibati, Kribi, Bangolan, Mamfe, Sabga, Lasin, Ndu, Ekoundoum, Mbingo, Etoug-egbe, Mboppi, Bango, Mutengene and Nkwen.

2.2. Study design/duration

This was a cross-sectional study involving the use of well-structured questionnaires which were carefully designed for respondents to assess knowledge on malaria signs/symptoms, prevention and management, as well as their health seeking behaviors. Responses ranged from strongly agree, agree, neutral, and disagree to strongly disagree.

2.3. Study population

Participants in the study were caregivers of children below five years who visited these health facilities. These were selected as the target population because of their relationship with the child and their roles in contributing to the fight against pediatric malaria and timely treatment. A total of 1131 caregivers were involved in the study.

2.4. Sample size estimation

2.4.1. Sample size calculation among healthcare providers

$$n = \frac{(Z)^2 \alpha p(1-p)d^2}{i^2}$$

Where:

n = sample size Za = constant (Confidence interval, 95%) = 1.96 at a = 0.05, d = d = 2 Correction factor

I = Precision of the event of interest (degree of accuracy) = 0.05

p (population prevalence) = 50% P is taken as 50% since no KAP study on knowledge gaps was seen for Cameroon.

$$n = \frac{(1.96)^2 \alpha 0.5(1-0.5) \times 2}{0.05^2} n = 385 \text{ participants}$$

p (population prevalence) = 50% P is taken as 50% since no KAP study on knowledge gaps was seen for Cameroon.

However data was collected from a total of 1131 to account for the possibility for none response rate.

2.5. Sampling technique

Health facilities were purposively selected to cover all the different epidemiological facets that have the potential to affect malaria transmission in the study areas. Caregivers of children below 5-years visiting the health facilities were randomly selected and recruited into the study.

2.6. Data collection procedure

Data collection was done using well-structured and self-administered questionnaire to obtain quantitative primary data. Data collectors were trained on the entire study, ethics and data collection procedure. Prior to the administration of the survey questionnaires, the duration, competency, and suitability of the questionnaires was pretested. The questionnaire were made up of two major parts. Part I on the demographic characteristics of the respondents. Part II on the other hand to capture data on the respondents knowledge on malaria, preventive measures and treatment seeking attitude. The questionnaire (Part II) was designed in the form of Likert rating scale, from (1) strongly agree, (2) agree, (3) neutral, and (4) disagree to (5) strongly disagree.

2.7. Statistical analysis

Quantitative data from the questionnaires was imputed in excel 2016 verified before exporting to SPSS version 25 for analysis. Demographic variables were expressed as percentages. To assess the level of knowledge on malaria prevention strategies and management, respondents were scored 1 if they have correct knowledge of a strategy and were scored 0 if they had incorrect knowledge of it. Knowledge scores were compared with the overall means scores to ascertain knowledge gaps.

2.8. Ethical considerations

Ethical approval for the study was obtained from the Cameroon Baptist Convention Institutional review board (Ref: IRB2021-54) while administrative authorization was obtained from all the health facilities involved. Participants in the study were provided with the participant information leaflet and signed the consent forms prior to their participation. Verbal consent was obtained for those who could not read nor write.

3. Results

3.1. Socio-demographic characteristics of study participants

A total of 1,131 care givers (parents and guardians) took part in the study. Missing values were excluded from the analysis hence the results displayed below are for valid cases. Majority of the caregivers were females 954(84.4%). Majority of the caregivers were between 21-30-years (53%) with children < 1-year (57.1%). Many had attained secondary education (48.9%). About half of the study participants dwelled in rural settings. Majority of the caregivers were biological parents (85.6%) who were married (81.3%), most of whom were unemployed (34.6%). The mean age of all the participants was 30 ± 7-years (Table 1).

3.2. Knowledge on the causes and modes of malaria transmission among caregivers

Generally there was high level of understanding on the causes of malaria and its mode of transmission. More than half of the respondents associated malaria with the *Plasmodium* parasite (58.3%) and its spread through the bites of the infected female Anopheles mosquitoes (90.7%) (**Figure 1**).

Table 1: Socio-demographic characteristics of study participants.

VARIABLE	Frequency n	Percentage %	Mean
Gender			
Male	177	15.6	
Female	954	84.4	
Age group			
10-20	90	8	
21 - 30	599	53	
31 - 40	382	33.8	30 ± 7-years
41 - 50	47	4.2	
51 - 60	9	0.8	
> 60	4	0.4	
Age of child			
< 1year	628	57.1	
1 ≤ 3-years	283	25.8	
3 – 5-years	188	17.1	
Location			
Rural	502	44.4	
Semi-urban	59	5.2	
Urban	570	50.4	
Level of Education			
No formal education	36	3.2	
Primary	214	18.9	
Secondary	553	48.9	
Tertiary	328	29	
Employment status			
Employed	316	27.9	
Self-employed	379	33.5	
Unemployed	391	34.6	
Relationship with child			
Parent	968	85.6	
Grand parent	15	1.3	
Relative	18	1.6	
Marital status			
Single	155	13.7	
Married	920	81.3	
Cohabiting	46	4.1	
Divorced	3	0.3	
Widow (er)	7	0.6	

3.2.1. Socio-demographic characteristics associated with care givers knowledge on the causes of malaria

Knowledge of caregiver's scores on uncomplicated malaria showed significant associations between correct knowledge score and gender, age of caregiver, age of child, level of education, employment status, marital status and relationship with child (**Table 2**). More females had good knowledge on the causes of malaria than males (87% versus 86.5%) however, there was no association between gender and knowledge on the causes of malaria ($X^2 = 0.028$, $p = 0.868$). Good knowledge on causes of malaria was higher in the age group 31-40-years (89.3%)

with the lowest percentage in age group < 20-years (75.0%), these results were statistically significant as ($X^2 = 13.504$, $p = 0.019$). As concerns marital status, caregivers who were either divorced or widow(er) had 100% good knowledge compared to married respondents 789 (88.1%) ($X^2 = 8.843$, $p = 0.65$). More so, those living in urban areas had good knowledge on causes of malaria than those in rural areas (91.3% versus 81.9%) and the results were statistically significant ($X^2 = 20.359$, $p = 0.001$). Concerning level of education, those who had attended tertiary education had good knowledge on causes of malaria while those with no formal education had the least percentage(95.1% versus 50.0%) with results being statistically significant ($X^2 = 64.763$, $p = 0.001$). Employment status reveal that, unemployed had poor knowledge than employed (18.4% versus 8.7%), the results reveal statistical significance association between employment status and causes of malaria ($X^2 = 15.995$, $p = 0.001$). Furthermore, there was a statistically significant association between caregivers relationship with child and knowledge on the causes of malaria ($X^2 = 6.077$, $p = 0.048$). Biological parents had the highest correct knowledge scores, followed by grandparents and lastly by relatives (33.3%, 14.3% and 13.2% respectively).

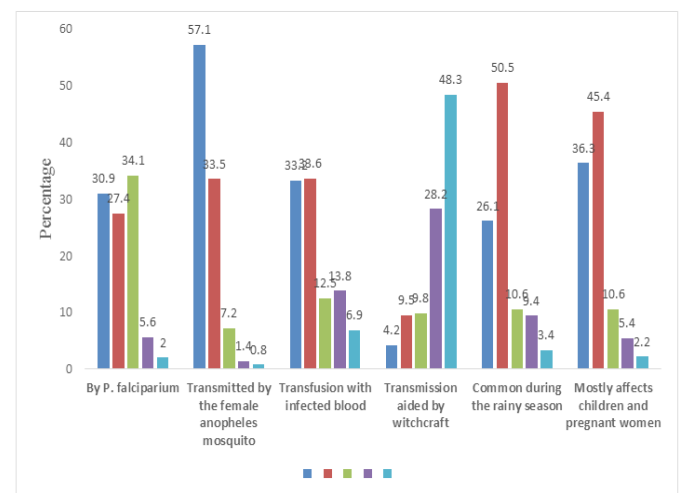


Figure 1: Knowledge on the causes and modes of malaria transmission.

3.3. Caregiver's knowledge on the signs and symptoms of malaria

Many of the caregivers rightfully identified the signs and symptoms of malaria i.e 94.4% indicated fever, chills, shivering and 89% indicated dizziness, headache and sweating as the main symptoms of malaria among children below 5-years. However many did not believe cough (43.7%) was one of the clinical signs and symptoms of malaria (3) **Figure 2 and Table 3**.

3.4. Caregiver's knowledge on the prevention of Malaria

Overall, the knowledge about malaria prevention methods was high among the caregivers (**Figure 3**). A total of 97.2% agreed on the use of ITNs, 81.1% indicated IRS as means of preventing malaria, 86.1 indicated the use of netted windows and doors, 74.4% indicated the use of protective clothing, 94.4% indicated environmental cleanliness and 82.0% indicated the use of mosquito repellants **Table 4**.

3.5. Healthcare seeking behavior of caregivers

Majority of the children under-five have had fever in the past 2 weeks (87.3%). More than half of the caregivers reported seeking healthcare in public/private health institutions 590 (52.2%) and 363 (32.1%) received treatment from local private drug vendors/pharmacies and only came to the hospital if it didn't

subside. A total of the caregivers 122 (10.8%) first consulted traditional healers and used herbs for malaria treatment in their children before coming to the hospital. While a total of 59 (5.3%) used left over medications from previous treatment and homemade remedies for treatment **Figure 4**.

Table 2: Socio-demographic characteristics associated with caregivers knowledge on the causes of malaria.

Variable	Poor knowledge (%)	Good knowledge (%)	Total	X ²	P*-value
Gender					
Male	23(13.5%)	148(86.5%)	171		
Female	121(13.0%)	811(87.0%)	932	0.028	0.868
Age group					
20-Oct	22(25.0%)	66(75.0%)	88		
21-30	75(12.8%)	509(87.2%)	584		
31-40	40(10.7%)	333(89.3%)	373		
41-50	6(13.3%)	39(86.7%)	45		
51-60	1(11.1%)	8(88.9%)	9		
> 60	0(0)	4(100%)	4	13.504	*0.019
Age of child					
< 1year	77(16.5)	390(83.5)			
1 ≤ 3years	19(8.6)	203(91.4)		7.885	*0.019
3-5-years	21(14.0)	129(86.0)			
Marital status					

Single	30(19.9%)	121(80.1%)	151		
Married	107(11.9%)	789(88.1%)	896		
Cohabiting	7(15.2%)	39(84.8%)	46		
Divorced	0(0%)	3(100%)	3		
Widow(er)	0(0%)	7(100%)	7	8.843	0.65
Location					
Rural	87(18.1%)	393(81.9%)	480		
Semi-urban	8(13.6%)	51(86.4%)	59		
Urban	49(8.7%)	515(91.3%)	564	20.359	0.001
Level of education					
No formal education	18(50.0%)	18(50.0%)	36		
Primary	34(16.4%)	173(83.6%)	207		
Secondary	76(14.2%)	460(85.8%)	536		
Tertiary	16(4.9%)	308(95.1%)	324	64.763	0.001
Employment status					
Employed	27(8.7%)	284(91.3%)	311		
Self-employed	41(11.3%)	322(88.7%)	363		
Unemployment	71(18.4%)	314(81.6%)	385	15.995	0.001
Relationship with child					
Biological Parent	125(13.2%)	820(86.8%)	945		
Grandparent	2(14.3%)	12(85.7%)	14		
Relative	6(33.3%)	12(66.7%)	18	6.077	0.048

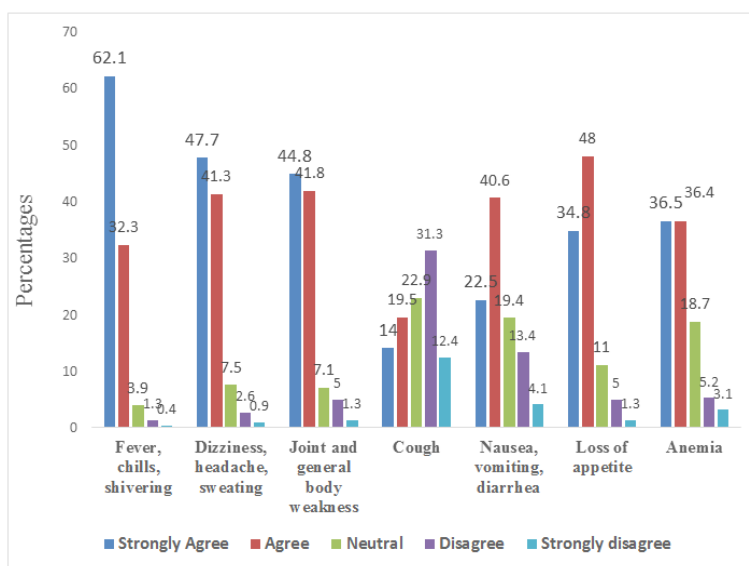


Figure 2: Caregiver's knowledge on the Signs and Symptoms of Malaria.

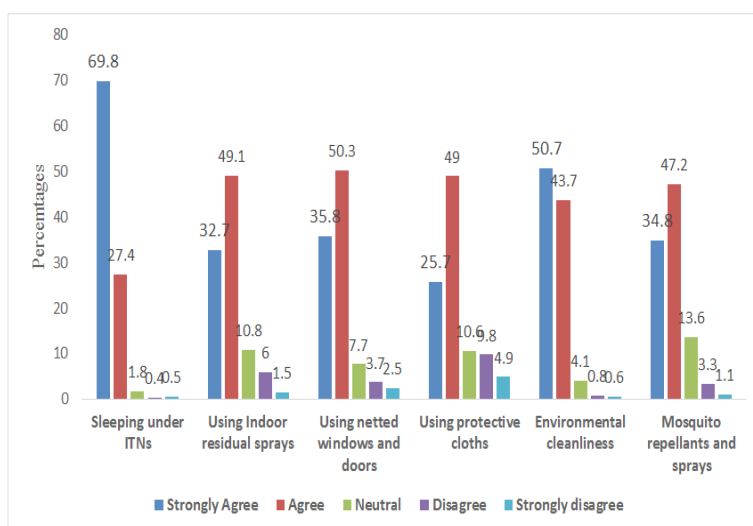


Figure 3: Caregiver's knowledge on the prevention of Malaria.

Table 3: Socio-demographic characteristics associated with caregivers knowledge on the signs and symptoms of malaria.

VARIABLE	Poor knowledge (%)	Good knowledge (%)	Total	X ²	P*value
Gender					
Male	15(9.0%)	151(91.0%)	166		
Female	89(9.5%)	851(90.5%)	940	0.031	0.86
Age group					
< 20	12(13.8%)	75(86.2%)	87		
21-30	52(8.8%)	539(91.2%)	591		
31-40	38(10.3%)	331(89.7%)	369		
41-50	2(4.3%)	44(95.7%)	46		
51-60	0(0.0%)	9(100%)	9		
> 60	0(0.0%)	4(100%)	4	5.298	0.381
Marital status					
Single	11(7.3%)	140(92.7%)	151		
Married	85(9.4%)	815(90.6%)	900		
Cohabiting	8(17.8%)	37(82.2%)	45		
Divorced	0(100%)	3(100%)	3		
Widow(er)	0(100%)	7(100%)	7	5.54	0.236
Location					
Rural	44(8.8%)	457(91.2%)	501		
Semi-urban	4(6.8%)	55(93.2%)	59		
Urban	56(10.3%)	490(89.7%)	546	1.17	0.557
Level of education					
No formal education	8(22.2%)	28(77.8%)	36		
Primary	21(10.0%)	189(90.0%)	210		
Secondary	47(8.7%)	494(91.3%)	541		
Tertiary	28(8.8%)	291(91.2%)	319	7.504	0.057
Employment status					
Employed	20(6.5%)	288(93.5%)	308		
Self-employed	48(12.9%)	324(87.1%)	372		
Unemployment	34(8.9%)	348(91.1%)	382	8.314	0.016
Relationship with child					
Parent	94(9.9%)	855(90.1%)	949		
Grandparent	0(0.0%)	15(100%)	15		
Relative	1(5.6%)	17(94.4%)	18	2.014	0.365

Table 4: Socio-demographic characteristics associated with caregivers knowledge on the prevention of malaria.

VARIABLE	Poor knowledge (%)	Good knowledge (%)	Total	X ²	P*value
Gender					
Male	5(2.8%)	171(97.2%)	176		
Female	53(5.6%)	897(94.4%)	950	2.279	0.131
Age group					
< 20	9(10.0%)	81(90.0%)	90		
21-30	27(4.5%)	569(95.5%)	596		
31-40	21(5.5%)	359(94.5%)	380		
41-50	1(2.1%)	46(97.9%)	47		
51-60	0(0.0%)	9(100%)	9		
> 60	0(0.0%)	4(100%)	4	6.496	0.261
Marital status					
Single	8(5.2%)	145(94.8%)	153		
Married	41(4.5%)	876(95.5%)	917		
Cohabiting	9(19.6%)	37(80.4%)	46		
Divorced	0(0.0%)	3(100%)	3		
Widow(er)	0(0.0%)	7(100%)	7	20.975	0.001
Location					
Rural	204(4.0%)	478(96.0%)	498		
Semi-urban	3(5.1%)	56(94.9%)	59		
Urban	35(6.2%)	534(93.8%)	569	2.478	0.29
Level of education					
No formal education	2(5.6%)	34(94.4%)	36		
Primary	8(3.7%)	206(96.3%)	214		
Secondary	32(5.8%)	516(94.2%)	548		
Tertiary	16(4.9%)	312(95.1%)	328	1.468	0.69
Employment status					
Employed	13(4.1%)	303(95.9%)	316		
Self-employed	17(4.5%)	360(95.5%)	377		
Unemployment	25(6.4%)	364(93.6%)	389	2.328	0.312
Relationship with child					
Parent	47(4.9%)	917(95.1%)	964		
Grandparent	0(0.0%)	15(100%)	15		
Relative	0(0.0%)	18(100%)	18	1.689	0.43

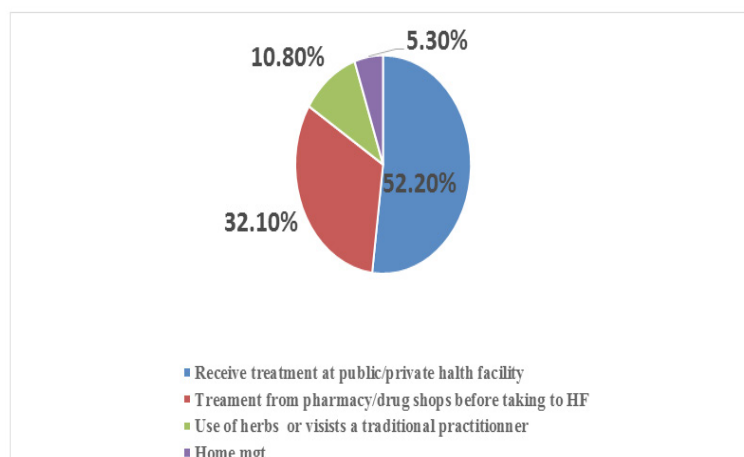


Figure 4: Caregiver's Healthcare seeking Behavior.

4. Discussions

In this study we assessed caregivers' perception about malaria and treatment-seeking behavior for their children under five years. The results indicate that almost all the study participants were knowledgeable about malaria and associated it with mosquito bite. Majority of the participants were aware of the common signs and symptoms of malaria and reported that malaria is preventable.

The majority of the caregivers reported that malaria could be transmitted from person-to-person through mosquito bites (90.7%), which was higher than previous studies in Ethiopia (70.9%)¹⁹ in Ghana (88.3%)²⁰ and the 35.2% from Nigeria²¹. Majority of the respondents also mentioned fever as the most frequently recognized symptom of childhood malaria, this finding corroborates with other study in Ethiopia²². Caregivers who resided in the urban settings, had a tertiary level of education, were employed and are the biological parents of the children were more knowledgeable on the modes of transmission than their counterparts. Many of the caregivers were knowledgeable on the clinical signs and symptoms of malaria. i.e 94.4% indicated fever, chills, shivering in children which was higher than the 75% in Ethiopia. Knowledge of the correct signs and symptoms would principally influence an individual's ability to take prompt and proper action at the onset of malaria, thereby triggering an appreciable treatment seeking attitude. The WHO and UK malaria treatment guidelines recommend early diagnosis and treatment as very essential in fighting malaria^{23,24}.

Likewise, majority of the participants were aware of the most common preventive methods of malaria and mentioned LLINs (97.2%) as the main prevention method for malaria. Other prevention methods included the use of IRS, the use of netted windows and doors, similar findings were obtained in Ethiopia²⁰, and in Ghana¹⁹ in which 25% indicated the use of protective clothing, environmental cleanliness and the use of mosquito repellents. Our findings show that 25% of caregivers reported that wearing protective clothes at night, especially long-sleeved clothes, will better to prevent mosquito bites.

Different healthcare seeking patterns were reported among caregivers. The main sources being health facility visits. However there were reports of unconventional methods such as the purchase from local roadside vendors, use of herbs and the visit of other trado-practitioners while pockets of participants agreed on undertaking home treatment with either previously bought drugs or herbal products. Essentially, majority of the respondents sought formal healthcare services from hospitals, clinics, or the community health workers in line with other study²⁵, although some other study²⁶ contradict this in favour of home treatment of some kind. The use of herbal concoction in 122 (10.8%) of cases reflect to some degree the practice of the use of traditional medicine in tropical Africa where 70-80% of the populations patronize traditional healers²⁷. The use of herbal mixtures is founded in the belief that herbs are efficacious in the management of diseases. In the south eastern Nigeria for example, Iloje²⁸ observed that 28.3% of parents believe that the best treatment for febrile convulsion is traditional medicine. Study in Cameroon shows the high use of herbal medicines for febrile conditions including malaria²⁹.

Most of the caregivers who were knowledgeable about common clinical manifestations reported that they visited health care facilities once they notice them. However, others reported visiting the health care facilities after the failure of

home remedies to cure the symptoms and our findings was similar to other studies^{30,31}. This highlights that even though most caregivers possess knowledge regarding relevant actions to be taken, others still lack awareness regarding positive health-seeking behaviours appropriate for malaria, which still requires attention.

5. Conclusions

Caregivers of children have adequate knowledge about malaria and its mode of transmission. More health education on the different preventive methods is still needed to help reduce the incidence of malaria among children. Despite heightened knowledge on malaria some caregivers still seek care from unconventional sources. From this study we therefore recommend public education about malaria mortality in children under 5 and use of LLINs through the media such as radio and television should be continued as well as health talks by health care providers and opinion leaders on malaria prevention and healthcare seeking behaviour. Also, malaria programs in partnership with the National malaria control program in Cameroon and MoH need to continue advocating for the use of LLINs and mosquito repellents. This will create further awareness of the use of LLINs as a malaria preventive tool in children under five. Furthermore, health workers should educate caregivers on the need to prioritize the health of their children especially those under 5-years when they witness fever or other signs and symptoms of malaria, by taking them to the hospital immediately for proper diagnosis and medical attention to prevent complicated malaria. There is need to identify perceived reasons for the various healthcare seeking behaviors that may contribute to delayed presentation at the hospital in the settings.

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7. Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

8. Conflicts of Interest

None.

9. Authors Contributions

ACW participated in the conception, design, data analysis, drafting of the manuscript, correction and proof reading for scientific content. NEN participated in the conception, design, correction and proof reading for scientific content. MKE participated in the validation of final data, manuscript writing and proof reading for scientific content. NEN took part in the design, data collection and data analysis. NSL participated in the validation of final data, manuscript writing and proof reading for scientific content. NEN took part in the design, data collection and data analysis. NSL participated in the validation of final data, manuscript writing and proof reading for scientific content. TEM, WD, TGG, NWG, SEA, NLD participated in data collection, data analysis, data analysis/interpretation and proof reading of

final manuscript for scientific content. TPM participated in the supervision of the research process, manuscript development, read and corrected the manuscript for scientific content. All authors read and approved the final copy of the manuscript.

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