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Knowledge, Attitude and Practices of Care Takers About Malaria Epidemiology Among Children Below the Age of Five Years Attending Munuki PHCC in Juba City

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Abstract

It is noted globally over 95 countries and territories have on going malaria transmission with an estimated 3.2 billion people who are at risk of getting infected. The WHO indicates that 214 million people are infected with malaria worldwide and of these 438,000cases result in deaths. Children below five years are the most susceptible to malaria illness which accounts for estimated deaths of 303,000 before reaching age five globally and 292,000 occur in the African region. The purpose of the study was to determining the prevalence of malaria and the associated risk factors among children below 5 years in Munuki PHCC, Juba Capital City, South Sudan. The study was a quantitative and cross section survey which involved a sample size of 243 care takers of 243 children below the age of five who attended Munuki PHCC. A convenient sampling method allowed data to be collected about malaria prevalence and the associated factors simultaneously in the months of August and September 2023. The prevalence of malaria was high 118(48.6%) and the factors that were significant with malaria prevalence included; house hold source of light (x^2= 8.560, P=0.036), care taker knowledge of signs and symptoms (loss of appetite) x^2=4.023, P=0.045) and environmental factor about presence of garbage heaps (x^2=4.322, P=0.038).

Keywords: *Determinants, Malaria, Prevalence, Under-Five.*

Introduction

Malaria is one of the world's most deadly diseases caused by an infection with single celled parasitic female anopheles mosquito. This remains a burden especially in the sub Saharan Africa despite all the efforts put in by the various countries to control and eradicate the disease in these areas. Its problem has further contributed to low economic progress especially among countries that have been affected by the disease.

In South Sudan malaria is still a major public health problem associated with slow economic development and poverty and is the most frequently reported disease at both public and private health facilities in Uganda. It accounts 30 - 50% of the outpatient visits at health facilities and 15 -20% of in patients or hospital admissions. Malaria accounts for 27.7% of deaths amongst children under the age of five. [2].

South Sudan is ranked third in the total number of malaria cases in sub Saharan Africa [3]. Malaria is the leading cause of morbidity in South Sudan with 90 -95% of the population at risk and contributing approximately 13% of the under-five mortality [4].

Children under five years are most vulnerable to malaria infection as their immunity is not yet developed to fight any disease [5]. Statistics from the ministry of health show that malaria is still the leading cause of death in Uganda accounting for 27% of deaths and that Uganda has the world's highest malaria incidence with a rate of 478 cases per 1.000 populations per year.

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In Munuki Juba where the study area is located, malaria is the most common cause of death in children and the district suffers the highest malaria burden in the country. This creates a reason to find out the prevalence of malaria and the associated factors in children below the age of five years.

The South Sudan's government's long-term objective is to ensure total eradication of malaria in all the endemic areas of the country and as such a lot of effort through funding has been sourced both internally and externally towards the above cause. A lot of sensitization and prevention measures of malaria such as education of individuals and families to sleep under insecticide treated nets, vector control through spraying (IRS), eliminating breeding places, and reducing infections through prophylaxis and treatment with ACTs. The government has also through the years 2009 - 2015 conducted several programs including integrated community case management (ICCM), integrated management of childhood illness (IMCI) and training of BHWs to offer curative malaria treatment at community level. [4].

Despite all these efforts malaria cases continues to remain high and one of the leading causes of ill-health and deaths in South Sudan. According to the records available in MoH, Juba the trend for the last three years indicated that malaria prevalence was at 17,216, in 2020, 17,322 in 2021, and 12,790 in 2022 both outpatient and inpatient of which 242 deaths were registered.

In Munuki Payam alone 7437 cases were registered in the same period of 3 years. The overall trend indicates that malaria is still a threat in the payam being one among the affected areas still has a high number of malaria cases being reported in the outpatient department. This therefore verifies that there could be several reasons or factors contributing to the high prevalence of malaria in Munuki PHCC despite all the efforts that the government has put in place to reduce on the infections.

As a result of this trend therefore, malaria infection has led to a high number of referrals due to complicated malaria which has resulted into complications like cerebral malaria, hypoglycemia, jaundice, severe anemia leading to increased number of in-patient admissions and deaths. The infection has also led to malnutrition, growth retardation, reduced school attendances and dropouts among the children. Malaria infection has also led to low economic growth as a lot is spent on treatment of the disease and this has left the people poor and economically devastated. It also contributes to low productivity as parents spend most of the time attending to the sick children.

Knowledge about malaria prevention transmission, but should have a positive attitude on the implementation of the preventive measures of malaria. Health unit workers, community health workers and VHTs together with stakeholders should put in more effort to ensure that information about malaria is communicated to the caretakers in languages best understood and should mainly target the vulnerable households in the community. The City council authorities and local leaders need to work with community to ensure proper garbage disposal. The city council health team has to liaise with the district health team to strengthen the health system on prevention and control of malaria through sustainable messages like posters on malaria, TV messages and programs on malaria.

According to the secondary data analysis of 2014 which was done in South Sudan conducted in December 2014 and January 2015 using a stratified two stage cluster design overall 938(19.04%, 95%CI 16.63-21.71) children under five out of 4930 in 2014 had malaria parasitaemia by microscopy and 95.65% of all these cases were due to p. falciparum. Foresight of fever in 2 weeks prior to the survey was reported in 285 out of the 938(30.33%)

children diagnosed with malaria parasitaemia. [16].

Children under five years are most vulnerable to malaria infection as their immunity is not yet developed to fight any disease. (CDC- Global health division for parasitic diseases and malaria, [17]. Statistics from the ministry of health show that malaria is still the leading cause of death in Uganda accounting for 27% of deaths and that Uganda has the world's highest malaria incidence with a rate of 478 cases per 1.000 populations per year.

Some 1,939 care givers of young children were recruited through a school-based survey in two states. A 20-item multidimensional survey instrument was developed and used to rank care givers knowledge in five dimensions which included the cause, transmission, vulnerability, symptoms and treatment. The predictor for ITN use was ITN ownership, however ownership only explains 43% 0f variance in net use. The total knowledge index for the study population was significantly associated with ITN ownership. Care givers knowledge of malaria and its causes was found to be poor were only 50% of the respondents knew that malaria is transmitted by female anopheles' mosquito and 65% still believe that too much exposure to the sun is a risk factor for malaria. Knowledge about the population vulnerable to malaria was 83% and knowledge of malaria transmission was 32% were the domain with highest and lowest average correct answers. [18].

Malaria is the main cause of morbidity and mortality among children under age five years in Malawi. Study was done to compare the prevalence and associated factors with malaria parasitaemia among children under the age of five years between 2012 and 2014 malaria indicator surveys. A multistage cluster sampling method was employed were total of 4040 children underage of five years were involved in the study. The 2112 (52%) were from the 2012 MIS and 1928 (48%) were from the 2014 MIS and these showed that the prevalence among the children underage of five years increased from 28% in 2012 to 33% in 2014($P>0.05$) and these showed a high prevalence of malaria among children below the age of five years [19].

A cross-sectional study was conducted in the district of Bata of the mainland of Equatorial Guinea involving 440 houses selected from 18 rural villages and 26 urban neighbourhoods were a total of 428 care givers were interviewed and the significant difference between rural and urban households was observed. On care giver malaria knowledge and beliefs, it showed that about 42% of the urban and 65% of rural care givers were un aware as to how malaria is transmitted (OR=2.69; 95%CL: 1.78-4.05) The presence of a malaria case was1.2 times more frequent in rural than in urban Bata were 78.91% of the household had experienced at least one case of malaria compared to 62.15 household in urban areas. The factors most significant and associated with the malaria knowledge were the level of education of care giver and the social economic status of the household. [20].

The study is limited to urban settlements and can not be applicable to rural settings.

To determine the prevalence of malaria and the associated factors among children under the age of five who attend OPD of Munuki PHCC, Juba City during the period of August and September. 2023.

Methodology

Study design: The study was quantitative using the cross- sectional survey design because the design was to allow data to be collected on prevalence of malaria and associated factors simultaneously at a particular point in time.

Study setting: The study setting was Munuki PHCC a government owned health unit located in Juba City. The health center serves a catchment area of five payams of Nukuki, Gudele, Kator and Togpiny It serves a total catchment population of 29,297 and 4,746 children under age of five years. The health center has a total of nineteen (19) staff who

include 2 clinical officers, 2 nursing officers, 3 enrolled nurses, 4 enrolled midwives, 2 laboratory technicians, 1 laboratory assistant, 1 health assistant, 1 nursing assistant, 1 information officer, 1 askari, and 1 cleaner. About 80 patients are seen on a daily basis in outpatient's department antenatal not inclusive. The health unit offers the following services; outpatient services, antenatal and maternity services, immunization and child health services, school and community outreaches, HIV/AIDS and ART clinics, tuberculosis testing and treatment services, Family planning, safe male circumcision, health education and STI screening and testing.

Study Populations

The target population was all the caretakers plus children under five years attending health care in Munuki PHCC. Accessible population included children under the age of five years and their caretakers who attended in Munuki PHCC Study population included caregivers and children under the age of five years who met inclusion criteria.

Sample Size Determination

The sample size was determined by calculations using the Kish and Leslie formula

$$N=\frac{Z2.P(1-P)}{D2}$$

Where;

N = Total number of subjects required in the sample.

Z = a standardized normal deviate value that correspond to the level of statistical significance

equal to 1.96.

P = estimate of prevalence of malaria in children under age 5 years in South Sudan which is 19.7% according to Danielle Roberts and Mathew Glenda 2016 [4] study on malaria prevalence in under 5 years.

D = margin of error which corresponds to the level of precisions of results desired= 0.05.

$$N=\frac{1.96x1.96x0.197(1-0.197)}{0.05x0.05}$$

$$N = 243$$

Sampling Method

Probability sampling technique was used to collect data where consecutive sampling method to enrol all the care givers of children below the age of five years to participate was used. All the children below five years who came in OPD were first seen by the clinician and those who had the signs and symptoms were sent to the laboratory for testing using mRDT and microscopy. The care givers of these children sent to the laboratory were requested to participate in the study and those willing were enrolled until when the sample size was reached. The children Who tested positive were used to determine the sample size.

Study Variables

The variables were the dependent and independent variables.

Dependent variable

The prevalence of malaria among children under five years old in Munuki PHCC was the dependent variable.

Independent variables

1. Caregiver factors which included, age of care giver, health seeking behaviors, knowledge about the disease, education level, marital status, occupation, attitude and practice.
2. Environmental factors included drainage system, bushy surroundings, garbage heaps, climate and altitude.
3. Household factors included number of household members, type of house, social economic status, sleeping patterns, place of residence, use of ITNs.

Data Collection Methods

Source of Data

Caretakers of children under 5 years were the primary source of data in this study.

Study Tool/ Instrument

A structured questionnaire was used to collect raw information on social demographic factors, care giver factors e.g. Knowledge about, the transmission and prevention of malaria, utilization and coverage of insecticide treated nets, environmental factors, and household factors. This was administered to the eligible participants were parents or guardians of children under the age of five years and were interviewed. The questionnaire comprised comprise of both closed and open-ended questions in English language.

Procedure for Data Collection

The researcher was introduced to the in-charge of the health center who then introduced her to the staff and the patients. The study was then explained to them to identify those who were eligible for the study. The children who were eligible for the study were seen by the clinical officer(s) who requested for microscopy or mRDT tests in the laboratory to screen those with positive and negative results respectively. The care givers of the children who were subjected to the test were interviewed by the research assistants using the questionnaire that were provided as they waited for the children to be tested. The questions were interpreted by the research assistants in local languages both English and Arabic respectively. The children who tested positive were used to determine the prevalence of malaria in children under the age of five years attending Munuki PHCC. The prevalence was the number of children who tested positive over the total number of children who engaged in the study. Vector species data was collected as secondary data from the facility health management information system (HMS).

Plasmodium falciparum was the most common malaria parasite which was readily detected by Rapid Diagnostic Tests (RDTs). RDTs, particularly using the Histidine-Rich Protein 2 (HRP2) protein.

Breeding places of anopheles vectors was investigated and primary data of near wetland or bushy areas, was collected from the participants.

Data Analysis Plan

This included descriptive analysis, and bivariate analysis.

Descriptive Analysis

Data concerning categorical variables was summarized and presented in frequency tables, bar graphs. Computing means, standard deviation was used to summarize data of numerical variables.

Bivariate Analysis

The association between proportions of the under five children who tested positive and those who tested negative was compared using a chi square. The relationship between independent variables and dependent was analyzed using chi square. Independent variables with P-value less than 0.05 were considered to influence the prevalence of malaria among children below age five.

Quality Assurance

1. Pretesting of the questionnaire to minimize and avoid errors with duplication.
2. Training and use of research assistants to ensure accuracy in the information given by all is not duplicated and to avoid bias in the study.
3. Supervision of data collection by the researcher.
4. Data was coded entered in Epidata software and cleaned in SPSS before analysis.

Ethical Considerations

Ethical committee approval from the MoH was granted, authorisation letter from the local authority to collect data was obtained, informed consents from the eligible participants were obtained, privacy and confidentiality of data was clearly stipulated in the consent form.

Results

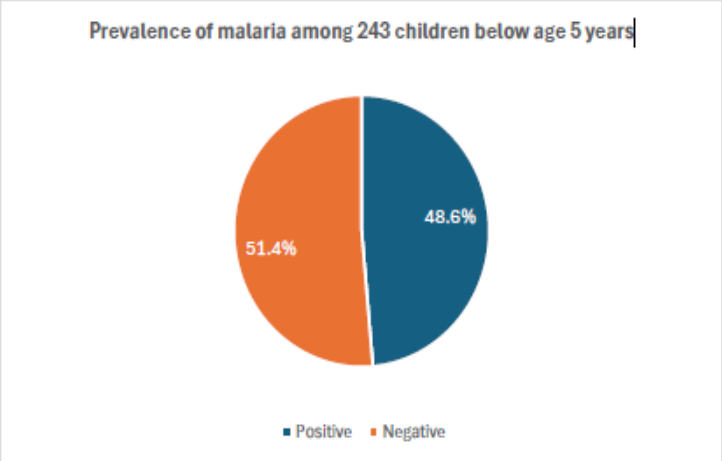
Table 1. Demographic Characteristics of 243 Caretakers of Children Aged Below 5 Years Munuki PHCC

Variable	Category	N	Percent
Gender	Female	187	77.0
	Male	56	23.0
Age	15-24	55	22.6
	25-34	92	37.9
	35-44	74	30.5
	45+	22	9.1
Marital Status	Single	44	18.1
	Married	145	59.1
	Separated	36	14.8
	Widowed	18	7.4
Level of education	None	46	18.9
	Primary	81	33.3
	Secondary	81	33.3
	Tertiary	35	14.4
Location	Close to a swamp	107	44.0
	Not close to a swamp	136	56.0

The total number of respondents was 243 and majority 187(77.0%) were females, 94(37.9%) were between the ages of 25-34years, 145(59.1 %) were married, most, 81(33.3%), had both primary and secondary level of education and 136(56.0%) did not stay close to a swamp as reflected in table 1.

Prevalence of Malaria

Figure 1. Prevalence of Malaria Among 243 Children Below age 5 Years in Munuki PHCC



A total of 243 children below age 5 years who attended Munuki PHCC coming from different locations of the town council were subjected to malaria diagnostic tests using both mRDT and microscopy. Of the 243 children,

118(48.6%) tested positive and 125(51.4%) negative as shown in figure 1.

Caretaker factors: Part 1

Table 2. Caretaker Factors (Demographic) Influencing Prevalence of Malaria Among 243 Children Below 5 Years in Munuki PHCC

Variable	Category	Positive	Negative	Chi-Square	P-Value
Gender	Female	91(77.1)	96(76.8)	0.003	0.953
	Male	27(22.9)	29(23.2)		
Age	15-24	18(15.3)	37(29.6)	7.637	0.054
	25-34	51(43.2)	41(32.8)		
	35-44	37(31.4)	37(29.6)		
	44+	12(10.2)	10(8.0)		
Marital Status	Single	20(16.9)	24(19.2)	1.002	0.801
	Married	70(59.3)	75(60.0)		
	Separated	20(16.9)	16(12.8)		
	Widowed	8(6.8)	10(8.0)		
Level of Education	None	26(22.0)	20(16.0)	2.600	0.457
	Primary	37(31.4)	44(35.2)		
	Secondary	41(34.7)	40(32.0)		
	Tertiary	14(11.9)	21(16.8)		
Location	Close to a swamp	59(50.0)	48(38.4)	3.314	0.069
	Not close to a swamp	59(50.0)	77(61.6)		

All caretaker demographic factors showed no statistically significant relationship with prevalence of malaria among children below age 5 years as indicated in table 2.

Caretaker factors: part 2

Table 3. Caretaker Factors (Knowledge) on Malaria Transmission and Prevention Influencing Prevalence of Malaria Among 243 Children Below 5 years in Munuki PHCC

Variable	Category	Positive N/%	Negative N/%	Chi-Square	P-Value
Ever heard about malaria	Yes	114(96.6)	119(95.2)	0.306	0.58
	No	4(3.4)	6(4.8)		
Mode of transmission	Mosquitoes	101(85.6)	110(88.0)	0.308	0.62
	Fly/animals	17(14.4)	15(12.0)		
Sleeping under nets	Yes	113(95.8)	121(96.8)	0.183	0.669
	No	5(4.2)	4(3.2)		
Wearing long-sleeved clothes	Yes	52(44.1)	51(40.8)	0.295	0.606
	No	66(55.9)	74(59.6)		
Spraying with insecticide	Yes	80(67.8)	90(72.0)	0.51	0.475
	No	38(32.2)	35(28.0)		

Destroying breeding places	Yes	100(84.7)	103(82.4)	0.243	0.622
	No	18(15.3)	22(17.6)		
Closing windows early	Yes	84(71.2)	88(70.4)	0.018	0.893
	No	34(28.8)	37(29.6)		
Use repellants	Yes	29(24.6)	42(33.6)	2.39	0.122
	No	89(75.4)	83(66.4)		
Clearing bushes	Yes	102(86.4)	99(79.2)	2.226	0.136
	No	16(13.6)	26(20.8)		
Time mosquito bites	Day time	7(5.9)	9(7.2)	2.164	0.539
	Nighttime	64(54.2)	67(53.6)		
	Day and night	45(38.1)	43(34.4)		
	I don't know	2(1.7)	6(4.8)		

No caretaker factors on knowledge about the transmission and prevention of malaria was significantly related to the prevalence of malaria among children below the age of five years in Munuki PHCC as shown in table 3.

Care giver factors: Part 2: cont.

Table 4. Caretaker Factors (knowledge) on Signs and Symptoms of Malaria in Children Below 5 Years in Munuki PHCC

Variable	**Category**	**Positive**	**Negative**	**Chi-Square**	**p-value**
High temperature	Yes	111(94.1)	118(94.4)	0.012	0.912
	No	7(5.9)	7(5.6)		
Loss of energy	Yes	79(66.9)	98(78.4)	4.023	0.045
	No	39(33.1)	27(21.6)		
Vomiting	Yes	102(86.4)	112(89.6)	0.576	0.448
	No	16(13.6)	13(10.4)		
Sweating	Yes	42(35.6)	48(38.4)	0.250	0.651
	No	76(64.4)	77(61.6)		
Headache	Yes	75(63.6)	92(73.6)	2.847	0.092
	No	43(36.4)	33(26.4)		
Joint pains	Yes	36(30.5)	53(42.4)	3.698	0.054
	No	82(69.5)	72(57.6)		
Loss of appetite	Yes	102(86.4)	109(87.2)	0.031	0.861
	No	16(13.6)	16(12.8)		
Chills	Yes	74(62.7)	78(62.4)	0.003	0.960
	No	44(37.3)	47(37.6)		
Convulsions	Yes	81(68.9)	77(61.6)	1.324	0.250
	No	37(31.4)	48(38.4)		

With the care take knowledge of the signs and symptoms of malaria, loss of energy (P=0.045, x^2=4.023) was significantly associated with prevalence of malaria in children below five years. However other factors were not significantly associated with malaria prevalence as shown in table 4.

Care giver factors: part 3.

Table 5. Caretaker Factors (Attitudes) Influencing Prevalence of Malaria Among243 Children Below 5 Years in Munuki PHCC Below 5 Years in Munuki PHCC

Variable	Category	Positive N/%	Negative N/%	Chi-Square	P-Value
I think malaria is a serious and threatening disease	Yes	108(91.5)	114(91.4)	0.008	0.928
	No	10(8.5)	11(8.8)		
I think the best way to prevent myself from getting malaria is to avoid malaria	Yes	92(78.0)	106(84.8)	1.879	0.17
	No	26(22.0)	19(15.2)		
I believe sleeping under a mosquito net during the night is one way to prevent malaria	Yes	106(89.8)	115(92.0)	0.347	0.556
	No	12(10.2)	10(8.0)		
Am sure that I can treat the child if he or she gets malaria	Yes	53(44.9)	61(48.8)	0.368	0.544
	No	65(55.1)	64(51.2)		
In my opinion children and pregnant mothers are at greater risk of getting malaria	Yes	99(83.9)	101(80.8)	0.4	0.527
	No	19(16.1)	24(19.2)		
I think that one can recover from malaria without any treatment	Yes	28(23.7)	39(31.2)	1.697	0.193
	No	90(76.3)	86(68.8)		
I think that it is dangerous if malaria medicine is not taken completely	Yes	105(89.0)	110(88.0)	0.058	0.81
	No	13(11.0)	15(12.0)		
I think that I should go to the health center to have my child's blood test	Yes	112(94.9)	110(88.0)	3.677	0.055
	No	6(5.1)	15(12.0)		

Caretaker attitudes towards prevention of malaria did not have significant influence on prevalence of malaria as presented in Table 5.

Table 6. Household Factors Influencing Prevalence of Malaria Among Children Below 5 Years

Variable	Category	Positive	Negative	Chi-Square	p-value
Type of house	Permanent house	43(36.4)	59(47.2)	2.885	0.236
	Semi-permanent house	58(49.2)	51(40.8)		
	Grass thatched	17(14.4)	15(12.0)		
Number of people in a house	<6	66(55.9)	69(55.2)	0.013	0.909
	>6	52(44.1)	56(44.8)		
Source of light	Firewood	6(5.1)	10(8.0)	8.560	0.036
	Candle	15(12.7)	29(23.2)		

	Lantern	59(50.0)	42(33.6)		
	Electricity	38(32.2)	44(35.2)		
Nature of rooms	Small	65(55.1)	73(58.4)	0.272	0.602
	Big	53(44.9)	52(41.6)		
Time to go to bed for children	6:00pm-7:00pm	33(28.0)	31(24.8)	1.051	0.591
	8:00pm-9:00pm	76(64.4)	80(64.0)		
	>10:00pm	9(7.6)	14(11.2)		
Use mosquito net	Yes	98(83.1)	107(85.6)	0.299	0.585
	No	20(16.9)	18(14.4)		

Prevalence of malaria among children below five years varied significantly with over different types of source of light used in the house (x^2 = 8.560, p=0.036) as shown in table 6.

Table 7. Environmental Factors Influencing Prevalence of Malaria Among Children Below 5years in Munuki PHCC

Variable	**Category**	**Positive**	**Negative**	**Chi-sqare**	**P-Value**
Water drainage	Good	66(55.6)	71(56.8)	0.019	0.892
	Bad	52(44.1)	54(43.2)		
CClear stagnant water	Yes	93(78.8)	90(72.0)	1.515	0.218
	No	25(21.2)	35(28.0)		
Have bushes around the home	Yes	62(52.5)	52(41.6)	2.918	0.088
	No	56(47.5)	73(58.4)		
Have garbage heaps	Yes	49(41.5)	36(28.8)	4.322	0.038
	No	69(58.5)	89(71.2)		
Monthly income	-135,000ssp	62(52.5)	68(54.4)	0.084	0.772
	>135,000ssp	56(47.5)	57(45.6)		

The prevalence of malaria among children below 5 years was dependent on whether garbage heaps in the environment were cleared or not (x^2=4.322, P=0.038 as indicated in table above.

Discussion of the Results

Prevalence of Malaria Among Children Below the Age of Five Years

The study findings showed that almost half of the children in this study were found to be sick with the parasite causing malaria which indicated a high prevalence of malaria among children below five years in Munuki PHCC which was the study area. This is almost three times a higher prevalence compared to the national prevalence of 19.7% [4] in their study that was carried out in South Sudan.

The probable reasons for the high prevalence is probably failure to effectively use preventive measures despite the caregivers having good knowledge on prevention and transmission of malaria. Measures like possession of ITNs cannot determine how it is effectively used to prevent the mosquito bites at night. Also caregiver's knowledge about malaria does not determine their effective application of these measures and their attitudes towards their

utilization. This may be the other reason for the high prevalence of malaria in the study area.

Future studies therefore need to assess the caregiver's knowledge on malaria in relation to the utilization of preventive measures as this was not investigated in this study. Comparing with the sample size and the population in obtaining the data the prevalence in the study area remained high compared to the national prevalence which is at 19.7% [6] malaria remains the number one killer disease in children below 5 years despite its decrease in prevalence to 19% and this has remained constant since 2009 when it dropped from 42% to 19% being highest in the east central region. [7].

The high prevalence of malaria has led to a high public expenditure both in the health system and the individual house holds on procurement of anti-malaria drugs, low productivity where care takers are seen spending a lot of time attending to the sick children, high school drop outs, poverty, retardation among children and the increased morbidity and mortality due to severe anemia, hypoglycemia and cerebral malaria as the common causes of death in children as compared to adults- though this was not investigated but can be proved from other studies or information for example the WHO over view on malaria indicates that children below five years were the most affected with malaria disease and this accounted for 69% of deaths among children in 2015.[8]. Strategies like improving the general prevention and control measure of malaria infections by involving all the stake holders in the community and the community at large to implement the measures and not stopping at only having the knowledge on malaria.

Caretaker Factors Influencing the Prevalence of Malaria

Considering the findings of the study on the care takers factors, demographic factors had no statically significant relationship with malaria prevalence among children below age five years. Caretaker's knowledge on malaria prevention; control and transmission were not significantly associated with malaria prevalence among these children. The findings of this study are not different from the study that was done in Malawi were a MIS indicated an increase in prevalence (P> 0.05) 33% in 2014 in children below 5 years of age despite the caretakers knowledge on prevention, transmission and control of malaria infection [9].

Loss of appetite and loss of energy among the signs and symptoms of malaria were significantly related to high malaria prevalence. The caretaker's attitude towards the prevention of malaria was not significantly associated with malaria prevalence according to the study. This is contrary to the study carried out in Nigeria were caregivers did not have enough knowledge on how malaria is prevented, controlled and even transmitted [10].

In another study that was carried out in Okomesi- Ekiti state [11] caregivers had good knowledge 99.7% on the prevention and transmission of malaria.

Though the caregivers had enough knowledge and good attitudes on malaria prevention, it still showed that little was done on the side of preventive measures and this could be associated with the care takers social economic status and this can be compared to a study that was done in Gambia which showed that children from families with low social economic status were more likely to suffer from malaria compared to those with a high social economic status [12].

There could be new breeding sites that have not been identified for example congested rooms, under chairs, in birth rooms in case of self-contained houses or houses that have birth rooms near residents with stagnant waters may be acting as breeding sites for mosquitos therefore there is need for further investigation on the same. The other probable reason may be lack of a boosting method of prevention like

IRS which had not been implemented in the study area as in other areas were similar studies have been done before for example in Botswana were significant progress has been noticed in the reduction of malaria prevalence in children below age of five through a sustained provision of both LLINs and IRS. [13]. In the similar study that was conducted in Uganda children who suffered from malaria were 7.6 times in households that were not sprayed compared to those from sprayed households. There is need for implementation of IRS in Munuki households as this is one of the recommended WHO strategies for eliminating malaria infection.

Other reasons for the caretaker factors that could be influencing the prevalence of malaria in children below five years would include sharing of drugs among the sick children, long distances to the health units, use of local herbs and delay in seeking for medical treatment. This is related to a study in Nigeria where 37% of caregivers preferred using herbs and only 17% could visit the dispensary for treatment of malaria [11].

Caretaker's lack of knowledge on signs like loss of energy and loss of appetite as signs of malaria can affect proper diagnosis and treatment seeking for children who might present with no other signs other than these two signs and this can lead to severe disease of complicated malaria increasing on hospital admissions and even mortality rates. There is need for proper and intense health education on the signs and symptoms of malaria so that none of the signs is neglected by the caregivers.

Environmental Factors Influencing the Prevalence of Malaria in Children below Age Five Years

With the environmental factor influencing malaria prevalence, garbage heaps was seen to be significantly associated with malaria prevalence among children below age of five years. A lot is needed to be done as this has been proved with other studies as being a breeding site of mosquitoes for example a study that was carried out in Bata district, Equatorial Guinea were care givers (24.77%) responded that garbage was a breeding site for mosquitoes both urban and rural [14].

In a similar study which was done in Bolifamba –Cameroon also proved that garbage heaps among other environmental factors like stagnant waters, swampy/bushy surroundings were highly associated with malaria infection [15]. Being a town council and seen to be a crowded place and over populated there is no free space for people to dispose their garbage so it is heaped around the house holds increasing or creating a favorable site for mosquitoes to breed and bite children. There is need for an organized system of environmental control programs to improve garbage disposal by the town council team and also households should be sensitized on storage before it is disposed to a specified destination. Proper use of preventive measures like sleeping under bed nets is another strategy to avoid mosquito bites to the children.

Household Factors Influencing Malaria Prevalence in Children Below Age Five Years

Malaria prevalence in children below age of five years in the study area varied significantly over the different type of sources of light used in the individual households as presented earlier in the results. This probably is due to failure of caretakers to utilize the preventive measures available with a miss conception that mosquitoes don't bite when there is light and they do bite only in the dark. This is contrary to the study done in Uganda where Children in households without electricity were more than one and a half times more likely to have malaria than those children in households with electricity (OR 1.756, 95 % CI 1.072–2.877). [4]. Caretakers should be encouraged to use the preventive measures despite the type of source of light they use in their households. They should ensure that the children sleep under the

mosquito nets regardless of the available type of source of light in the household.

Conclusions

1. The prevalence of malaria among children below age five was very high with as almost half of the sample size of children were tested positive with a proportion (48.6%), negative (51.4%).
2. Knowing that malaria causes loss of energy and loss of appetite were the only caretaker factors that influenced prevalence of malaria.
3. Source of light was the only household's factors that significantly influenced prevalence of malaria among children below five years.
4. Similarly occurrence of malaria among children below five years was significantly influenced by presence or absence of garbage heaps in the home environment.

Recommendations

The following recommendations can help control high malaria prevalence in among children below five years of age attending Munuki PHCC.

Re enforcement of communication strategies and information dissemination to change individual and community behavior and attitudes towards the control and prevention of malaria and insist that they should not only have knowledge of the transmission and control but put in practice or implement the acquired knowledge practically both individually and as a community at large. This should be delivered by well and appropriate trained community health workers, BHWs, health unit staffs in the local languages that are most understood and mainly to vulnerable households.

Efforts should be made for these care takers to know and understand every sign and symptoms of malaria especially those that significantly contributed to the high prevalence of malaria for example loss of appetite and loss of energy which are serous signs of severe malaria.

The City council administrators should find a way of how to dispose garbage to avoid heaps around the households and also find and strategize a way of involving the entire town council community and the surrounding communities on how to avoid garbage in their households as this is another suitable breeding site for mosquitoes. The City council authorities should liaise with the district officials to lobby for electrify as a better source of light in the house as variant source of light was seen to be significantly influencing malaria prevalence in children below age of five years.

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