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Prevalence and Trend of Malaria Disease among Under Fives in a Primary Health Center of Anambra State, Nigeria:A three-year Retrospective Study (2012-2014)

Chineke HN[1],Egenti BN[2],Egwuatu CC[3], Okeke CN[4], Adogu POU[5], Ilika AL[5]
[1]*Department of Family Medicine, Imo state University Teaching Hospital, Orlu, Nigeria*
[2]*Department of Community Medicine, University of Abuja, Nigeria*
[3]*Department of Medical Microbiology, NnamdiAzikiwe University UniversityAwka, Nigeria*
[4]*Faculty of Medicine, NanamdiAzikiwe University, Awka, Nigeria*
[5]*Department of Community Medicine, NnamdiAzikiwe University UniversityAwka, Nigeria*

Abstract
Introduction: *Malaria, an endemic disease in the tropics and subtropics, is a major cause of death in children under-five years of age worldwide. It accounts for 60% of outpatient visits and 30% of hospitalizations among Nigerian children in this age group. Several measures have been put in place to reduce the malaria burden. This study determined the prevalence and trend of malaria among under-five children in a malaria sentinel primary health centre in Awka south local government area of Anambra State, Nigeria over a three year period.*
Methodology:*It was a descriptive cross-sectional studycarried out by analyzing records in the health center. All under-five children who were brought to thecentrewithinthe three-year period, and whose records were available and complete were included in the study. Necessary datacollected retrospectively from the registers wereanalyzed and presented in tables, charts and graphs.*
Results:*Out of a total of 2306 under-fives recruited, 1640 (71.1%) were diagnosed of malaria, and made up of 828 (50.5%)males and 812 (49.5%) females giving a male to female ratio of 1.02:1. Malaria cases were highest among 10-19month age group and lowest among 50-59month age group. There was a progressive decline in the proportion of malaria cases from 2012 to 2014. Fever (92%) was the most common presenting complaintwhile the ACTs (61.4%) were the most commonly used drugs for treatment.*
Conclusion/Recommendation: *Although the proportion of malaria cases in under-fives appeared to decline with each passing year, the disease still remained the commonest cause of allsicknesses and hospital admissions in this age group. Therefore, implementation of the malaria control measures should be sustained while also looking at other causes of feverfor more accurate diagnosis and to reduce the burden of this disease in under-five children.*
Keywords: Malaria; Prevalence;Primary health center; Trend; Under-five.

I. Introduction

Malaria is an endemic disease of the tropics and subtropics and it is found in regions lying roughly between latitudes 60^0N and 40^0S.[1]It is the commonest cause of hospital admissions in all parts of Nigeria.[2] Even within the tropical and subtropical regions, considerable variations in the prevalence and severity exist due to variations in climatic and environmental conditions.[1]Malaria remains a major public health problem in Nigeria where it accounts for more cases and deaths thanin any other country in the world. It has remained the 3rd leading cause of death for children under five years worldwide, after pneumonia and diarrheal diseases and second commonest infectious cause of death in Africa after HIV/AIDS.[3] It is still number one killer disease of children under five years of age in Nigeria. Malaria kills one child every 30 seconds, about 3000 children every day, and about 1 in every six deaths of children and one in every ten deaths of pregnant women is as a result of malaria.[4]

Children with uncomplicated malaria usually present with the symptom of fever which is the commonest and occurs in paroxysms[5].They can also present with headache, bilious vomiting, jaundice with passage of dark urine, pallor, pain and other aches like abdominal pain, headache, or generalized body pains.[5] Diarrhea, cough, anorexia, malaise, unusual outbursts of crying, sleep disturbance and drowsiness may also be present.[5]

The diagnosis of malaria can be clinical, parasitological (microscopic), immunological or molecular.Clinical diagnosis requires a high index of suspicion coupled with examination findings.Parasitological method is the most certain means of diagnosing all four types of human malaria parasites.[6] It could be done by thick and thin blood smear, stained with Giemsa stain (the gold standard in developing countries)[6] or by rapid diagnostic test.

The primary goal of treatment in malaria is to cure the patient of the infection and thereby reduce the morbidity and mortality. The second goal is to encourage rational drug use to prevent or delay the development of antimalarial drug resistance.[2] The treatment options available are:artemisinin based combination therapy (ACT) for uncomplicated malaria and parenteral quinine and artesunateamong other drugs for complicated malaria.[2]

Public health prevention and controlmeasures include individual measures like regularuse of long lasting insecticide treated nets (LLITN), use of protective clothing and the use of mosquito repellants and insecticides.Vector measures includinguse of insecticides and larvicides, and destroying the breeding sites of mosquitoes by emptying stagnant waters around the living place can also be applied. Community measures like early diagnosis and treatment of malaria, and the application of roll back malaria initiative[6]are the other viable preventive options against the disease.

Information on the prevalence of malaria and its trend in children less than five years of age at the local level is very limited and often not well documented. Malaria burdenamong children less than five years in this environment is seemingly huge and its effects on this age group are devastating. It is therefore pertinent to establish the actual prevalence and trend of this disease and to apply the knowledge of these factors in planning effective control measures. Moreover, the findings will hopefully inform more efficient resource allocations to control of endemic diseases in the study environment.

This study was aimed at determining the prevalence and trend of malaria in children less than five years of age, through retrospective review of records over a 3year period (2012-2104). Also the study investigated the presenting complaints of the affected children and the commonly applied treatment options for the disease in the area.

II. Methodology

Study area: This study was carried out at a malaria sentinel primary health centre in Umuanum village Niboin Awka-South Local Government area, Anambra State, Nigeria.

Study population: The study population was children under-five years of age who attended or were referred to the health centre between 2012 and 2014.

Inclusion andExclusion criteria: All children under-five years of age who attended the health centre and whose records are available for the period of study were included in the study. Children without hospital records or incomplete records were excluded from the study. Also, children under-five years of age without any provisional or definitive diagnosis were excluded.

Study design: The study was a sentinel health facility-based cross-sectional study in which patients' case files and folders were used to gather information for assessment of the prevalence and trend of malaria at the health centre over a period of three years (2012-2014).

Data collection tool: Relevant data was collected from the health facility's record books and patients' folders using a proforma.

Minimum sample size: This was calculated using the formula: $N = \frac{Z^2pq}{d^2}$where:N= the desired sample size,d= degree of precision or acceptable error margin at 5% (0.05). z= confidence limit of the survey at 95% confidence level usually set at 1.96, p= proportion of under-fives found to have malaria parasite in their peripheral blood[7], p=1-p.Using the p value of 80.3% (0.803), q=1-0.803 = 0.197.N $= \frac{1.96^2 \times 0.38 \times 0.62}{0.05^2}$= 362.03. To take care of attrition rate at 10%; N=398.

Data collection: Data was collected from relevant registers, laboratory result registers and patients' folders from 2012 to 2014 using a profoma to retrieve the data. Attendance register to the health centre was reviewed from January 2012 to December 2014. Data was collected on the number of children under-five years of age that attended the health centre, date of admission, age, gender, presenting complaints, necessary investigations and the diagnosis. Folders of those diagnosed of malaria were retrieved to get information on the method used in making the diagnosis, treatments offered to proven malaria cases, and deaths recorded during the period under study.

Data analysis: Data was analyzed using Microsoft excel of the computer andresult presented in frequency tables, charts and graphs for easy appreciation. The total number of admissions and number of malaria cases were obtained and the monthly and yearly prevalence of malaria derived.

Ethical considerations: Approval for study was obtained from NnamdiAzikiwe University Teaching Hospital Ethics Committee (NAUTHEC) through the Head of department of community medicine. Permission was also obtained from the management of the health centre where the study was carried out. Absolute secrecy and confidentiality were maintained throughout the data collection process.

Limitation of study: Missing folders and incomplete information in the registers were the most important limitations of the study. However, each source of data was used to compliment the other under such a difficult circumstance.

III. Results

Table 1shows that the total number of patients seen within the 3 year period of study was 2306 under-fives (1168 males and 1121 females). Out of these, 1640 (71.1%) were diagnosed to have malaria.In 2012, the malaria prevalence was 77.0%, 72.4% in 2013 and 60.8% in 2014.Out of the 1640 under-fives that were diagnosed of malaria, 828 (828/1640*100; 50.5%) were males while females were 812(812/1640*100; 49.51%), giving a male to female ratio of 1.02:1.

Figure 1 depicts that the age group with the highest malaria infection rate was between the ages of 10 – 19 months with 460 (28.5%), and the age group with the least infection rate was between 50 – 59months with a total number of 24 (1.5%) of all children diagnosed of malaria. The ages of those diagnosed of malaria ranged from 2days to 59months with the mean age of approximately 22months.

From fig. 2 above, it can be seen that malaria infection is most common during the months of rainy season, especially September in 2012 and 2013 and June in 2014. The malaria infection also seemed to be high during harrmattan period as there was an increase in the number of people infected with malaria in January in 2012, 2013 and 2014 after a decrease in December. Malaria infection was lowest in July in 2012, April in 2013 and March in 2014.

The number of children diagnosed of malaria progressively decreased from 2012 to 2014 as shown in the figure 3. In 2012, a total of 681 under-fives were diagnosed of malaria. In 2013, 590 under-fives were diagnosed of malaria while in 2014, 369 under-fives were diagnosed of malaria with a prevalence.

Table 2 shows that, out of the total number of 1640 patients diagnosed of malaria, 92.0% presented with fever. This was followed by cough with 585(35.7%). Other complaints the patients presented with were vomiting (11.7%), diarrhea (9.0%), loss of appetite (7.9%), catarrh (10.2%), and so on. Out of the 92.0% that presented with fever as a complaint, 10.0% had fever as their only presenting complaint while the remainder had other symptoms aside fever. The table also shows that 1.8% of all the 2306 under-five folders reviewed, presented with fevers that were not due to malaria.

From table 3, the commonly utilized drug for the treatment of those diagnosed of malaria was ACTs in combination with other non-antimalarial drugs (39.6%). This was followed closely by the use of ACTs alone with a percentage of 21.8%. Therefore, a total of 61.4% (1008) of the patients received one form of ACT drug or the other. About 11.4% of those diagnosed with malaria were treated with non-antimalarial drugs only while 7.7% (126) patients out of the 1640 diagnosed of malaria received no form of drug treatment). Other antimalarial drugs commonly utilized apart from ACTs include Artesunate (3.9%), Quinine (3.1%), Sulphadoxine-Pyrimethamine (0.9%), Chloroquine (0.4%), maladox (0.3%), Halofantrine (0.3%) and other drugs (0.2%), in the order of their decreasing usage.

IV. Discussion

Malaria is still regarded as one of the killer diseases in children. Studies have shown that children below the age of five years are at the greatest risk of being diagnosed and admitted for malaria infection than any other age groups. This is partly due to low immunity often seen among under-five years children including those living in endemic areas such as Nigeria[8]. A total of 2306 (1168 males and 1121 females) under-fives attended the health centre during the period under review. The overall prevalence of malaria in children under-five years from 2012-2014 was 71.1%. This is an indication that malaria burden among under-fives is still on the high side. This result is comparable to the outcome of another study in a resource-poor setting of a rural hospital in eastern Nigeria which reported a prevalence rate of 80.3% [9]. Similarly, a study in Aba, Nigeria had a prevalence of 65.0%.[10] However, the prevalence in our study was much higher than the 34.9% obtained in Nouakchott[11]. This discrepancy may be attributed to differences in the geographical climatic conditions and variations in malaria diagnostic methods.

This study showed there was a slight male preponderance of malaria infection with a male to female ratio of 1.02:1. This result is similar to that obtained in Benin City, Nigeria where malaria prevalence was higher in males (57%) than in females (43%) although there was no significant association between gender and malaria.[12] Conversely the findings differ from the result of a study carried out by Osuagwu et al where the females have higher prevalence than males.[13]

There were age-specific variations in malaria infectivity in that the age group with the highest infection rate of malaria is between 10 – 19months (28.1%), and this was higher than the prevalence among the 0-9months age group.This pattern may be due to the reported breast-milk conferred immunological protection enjoyed by infants in their first 6months of life. It can also be attributed to some passive immunity derived from the mother in-utero by the fetus. However, as the child is weaned off breast milk, the immunity level which was not very much developed naturally drops exposing the infant to increased susceptibility to malaria. It is interesting to note that malaria prevalence dropped progressively from age group 20-29 months to 50 – 59months which recorded the lowest prevalence of 1.5%. Thistrend can be ascribed to increased immunity that comes with maturity, especially among inhabitants of malaria endemic regions[14]. These findings however, vary slightly with outcome of another study on malaria and anemia among Nigerian children in which the 12-24months age group recorded the highest prevalence of 90%.[15] Also, a similar study in Benin recorded the highest prevalence among the age ranges of 6-24months (58.6%). The slight discrepancy between the cited studies and our current study could be explained by the differences in age groupings.

On the other hand, the result varied greatly from the finding in the 2010 NMIS[16] where the highest prevalence rate was found among children aged 48-59months (58.2%) and the lowest prevalence seen in those aged between 9-11months (40.4%). These age-specific variations in the prevalence rate may be due to the approach used for diagnosis and also the geopolitical region involved.

The prevalence of malaria seemed to be decreasing from 2012 (77.04%) through 2013 at 72.4% to 60.8% in 2014. This progressive decline may be due to improvement in the measures to prevent malaria infection and also in the drug treatment of already diagnosed cases. The progressive decline may also be as a result of improvement in the diagnostic methods as it has been found that some cases of fever are not ascribed to malaria these days, rather the diagnosis is based on RDT positivity. The decline may also be arbitrary arising from poor record of data. This result varied slightly from what was obtained in a Gombe state study where the prevalence decreased in 2008 by about 9% and then increased in 2009.[17] At the level of Africa, it was found that the prevalence rate declined steadily and reached a significant level in 2008 and then there was a resurgence in 2009 and 2010.[18] These differences may be due to the climatic changes in the regions where the studies were carried out, and it may also be due to differences in the period the study was carried out. In India, there was a decline by 5.7% in 2012 when compared to 2010.[19] This is similar to the result of this study and the similarity in terms of the decline may be due to the improving malaria control measures worldwide.

This study has shown that malaria is more common during the rainy season as September witnessed the highest prevalence of infection in 2012, and 2013. This great disparity in figures obtained in September 2012 and 2013 with the decline in September 2014 may be because most of the diagnosis of malaria in the years 2012 and 2013 were basically clinical and devoid of any confirmatory laboratory tests. However in 2013, most of the diagnoses were based on RDT positivity. Another reason for this trendmay be a possible malaria sensitization programme held within that period in 2012 and 2013. In 2014, June recorded the highest proportion of children infected with malaria, at 13.2%. This result is comparable with the findings of similar studies in Burkina Faso and Mauritania which revealed that malaria prevalence was highest during the rainy season.(11,20) Thesefindings are hardly surprising in view of the considerable variations in malaria prevalence according tochanges in climatic conditions because rainfall is essential in providing breeding sites for mosquitoes.(6)

Fever remains the most common presenting complaint of patients diagnosed with malaria because in this study, 92% of the respondents gave a history of fever with 10% having that as their only presenting complaint. Cough (35.7%) and vomiting (11.7%) were the next major presenting complaints while the least common presenting symptom was convulsion (2.9%). These findings were similar to the outcome of a study in south-west Nigeria where fever was reported as the commonest presenting symptom.[21] Similarly, a Tanzania study revealed that all the under-fives diagnosed of malaria presented with fever or history of fever.[22] This similarity in the presenting complaint irrespective of the region the study was done is likely because the pathophysiology of malaria in the human body is basically the same for all individuals.[23]

It is interesting to note that 1.8% (42) of the reviewed 2306 children presented with fevers that were not as a result of malaria. A Lagos study [24]has identified other causes of fever in children as meningitis, bronchopneumonia, septicemia, diarrhea and sickle cell diseases complicated by septicemia. This 1.8% would have contributed to the pool of over-diagnoses of malaria in most settings where the diagnostic criteria are limited to clinical signs and symptoms only. The progressive decline in trend of malaria prevalence as revealed in this study might lead one to suspect that the burden of malaria particularly among children less than five years may not be as high as often assumed in our environment. Effective malaria control measures instituted over the years in Nigeria may have begun to yield positive results in terms of better epidemiological and clinical indices for the disease. This is a subject for a future research.

Artemisinine-based combination therapy (ACTs) is basically the recommended drug of choice for the treatment of malaria these days. Out of the 1640 under-fives diagnosed of malaria, ACTs only were utilized in the treatment of 21.8% of the cases while another 39.6% of the patients received ACTs in combination with

other non-antimalarial drugs during the course of their treatment. This brought the total number of cases treated with ACTs to 61.4%. Chloroquine was used in only 0.4% while Quinine was used in 3.1%. This result is an indication that the WHO recommendation that ACTs be used as first line drug in the treatment of uncomplicated malaria was largely practiced in this environment. This is in contradistinction to the outcome of a similar study in south-west Nigeria between 1997 to2006 where chloroquine was found to be the most commonly prescribed antimalarial drug (26.5% of cases) while ACTs were only prescribed in 7.9% of cases.[22]ACTs were probably not in common use at that time in the south-west of Nigeria. On the other hand, a study in Ghana revealed that 89.9% of the patients received the right medication (ACT). [25] Therefore, the WHO guidelines recommended for the treatment of malaria is largely globally implemented.

In conclusion, malaria remains one of the commonest causes of under-five morbidity and hospital admissions in Nibo community and environs,despite theobserved progressive decline in the prevalence of the disease. Therefore, the disease should continue to receive desired attention from government and non-governmental stakeholders.Re-enforcement of the already existing effective malaria control tools like the use of LLITNs by making the nets available and affordable to every member of the community should be encouraged. The study suggests that an increasing number of fevers are not really malaria and as such a more sensitive and specific diagnostic procedure should be developed.The health workers should be sensitized on the need for prompt and adequate diagnosis of malaria by microscopy or alternatively by RDT as recommended by WHO before treatment is initiated. Besides this, other common causes of fever in this environment apart from malaria should be considered in order to achieve increased treatment success for fevers among under-fives. Rainy season is the period with the highest malaria infectivity and fever remains the most common presenting symptom. This finding will continue to inform policy, and influence preventive and treatment decisions for the disease. Finally some diagnosed cases of malaria among under-fives are still, sometimes,wrongly treated. Concerning this, it is recommended that the WHO guidelines on the drug treatment of malaria should be strictly followed to help reduce mis-treatment of the diseases by health practitioners.

References

[1]. Ogala WN. Infectious diseases: Malaria. In: Azubuike JC, Nkanginieme KEO. Paediatrics and Child Health in a Tropical Region. Second edition, Nigeria: University of Port Harcout Press; 2007. p 596-600.

[2]. Federal Ministry of Health (FMOH). National Antimalarial Treatment Policy. FMOH, National Malaria and Vector Control Division, Abuja, Nigeria 2005.

[3]. United Nations International Children's Emergency Fund (UNICEF), 2010.

[4]. United Nations International Children's Emergency Fund (UNICEF), 2013.

[5]. KwabeTS ,Abdulfatai O, Agbam EF, Usman A, Bashiru AM. Mothers Management of Malaria Fever among Under-Five Nomadic Fulani Children of Northeastern Nigeria. American Journal of Infectious Diseases and Microbiology, 2013; 1(2):26-33.

[6]. Gilles HM, Lucas AO. Short Textbook of Public Health Medicine for the Tropics, Revised fourth edition, London: Gutenberg Press Ltd; 2003. Pp199-207.

[7]. Daboer J C, Chingle M P, Ogbonna C. Malaria parasitaemia and household use of insecticide treated bed nets: A cross-sectional survey of under-fives in Jos, Nigeria. Niger Med J 2010;51:5-9.

[8]. World Health Organization (WHO). Malaria in under-fives, April 6, 2015.

[9]. Iloh GUP, Amadi AN, Nwankwo BO, Ugwu VC. Common Under-five Morbidity in South-Eastern Nigeria: a Study of its Pattern in a rural mission General Hospital in Imo State. Niger J Med. 2011 Jan-Mar; 20(1): 99-104.

[10]. Etusin PC, Kalu C, Nduka FO, Kalu EC, Melariri PE, Nwoke M and Aduaka AC. Studies on the Prevalence of Malaria among Children with Spenomegaly in Aba Metropolis, Abia State, Nigeria. Journal of Medical and Applied Biosciences 2013; 5(1): 55-66

[11]. Lekweing KM, Basco LK, Salem MS, Hafid JE, Marin-Jauffre A, Weddih AO, et al. malaria Prevalence and Morbidity among Children reporting at Health Facilities in Nouakchott, Mauritania. Trans R Soc Trop Med Hyg. 2011 Dec; 105(12): 727-33.

[12]. Okafor FU and Oko-Ose JN. Prevalence of Malaria Infections among Children aged Six months to Eleven years (6month-11years) in a Tertiary Institution in Benin City, Nigeria. Global Advanced Research Journal of Medicine and Medical Sciences [ISSN: 2315-5159] November, 2012; 1(10):273-279.

[13]. Ezeigbo OR, Osuagwu MC, Ezike MN, Ibegbulem ZO and Kalu S. Malaria Parasitemia in Children Aged 1-5years in Aba, South Eastern Nigeria. US Open General Microbiology Journal. 2014; 1(1): 1-6.

[14]. Doolan DL, Dobaño C, and Baird JK, Acquired Immunity to Malaria ClinMicrobiol Rev. 2009 Jan; 22(1): 13–36 doi:10.1128/CMR.00025-08ef.

[15]. Oladeinde BH, Omoregie R, Olley M, Anunibe JA, Onifade AA, and Oladeinde OB. Malaria and Anaemia among Children in a low Resource Setting in Nigeria. Iran J Parasitol. 2012; 7(3): 31-37.

[16]. National Population Commission (NPC), National Malaria Control Programme (NMCP), ICT International. Nigeria Malaria Indicator Survey 2010. Abuja, Nigeria: NPC, NMCP, and ICF International.

[17]. Lamogo Y and Yoriyo KP. A Retrospective Survey of Malaria Prevalence in Under-five age group: A Case study of Kaltungo General Hospital, Gombe State, Nigeria. Journal of Medical and Biological Sciences, 2013; 3(2): 68-76.

[18]. Sekou S, Fati KS, Sophie S, Halidou T, Fidele B, Issa N, et al. Paracheck Rapid Diagnostic Test Detecting Malaria Infection in Under five Children: a population-based survey in Burkina Faso. Malar J 2014; 13: 101.

[19]. Freddie M, Emmanuel C, Pascalina CK, Busiku H, Hieronymo TM, Mulakwa K, et al. Review of the Malaria Epidemiology and Trends in Zambia. Asian Pac J Trop Biomed. Feb 2013; 3(2): 89-94.

[20]. Neeru S, Sunil KC, Praveen KB, Mrigendra PS, Gyan C, Ashok KM, et al. Dynamics of Forest Malaria Transmission in Balaghat District, Madhya Pradesh, India. PLoS One. 2013; 8(9): e73730.

[21]. Omole MK, Okoye E J. A Ten Year Study of the Management of Malaria at a Tertiary Hospital in South West Africa. Asian Journal of Pharmaceutical and Clinical Research, 2011: 26-30.

[22]. Mubi M, Kakoko D, Ngasala B, Premji Z, Peterson S, BjorkmanA,et al. Malaria Diagnosis and Treatment Practices following Introduction of Rapid Diagnostic Tests in Kihaba District, Coast Region, Tanzania. Malaria Journal 2013' 12: 293.

[23]. Parroche P et al. Malaria hemozoin is immunologically inert but radically enhances innate responses by presenting malaria DNA to Toll-like receptor 9. ProcNatlAcadSci U S A 2007 Feb 6; 104:1919-24.
[24]. Oshikoya KA, Senbanjo IO Fever in children: mother's perceptions and their home management.Iran J Pediatr, Sep 2008; Vol 18 (No 3): 229-236ref.
[25]. Gyapong RNK, Duwiejua M, Bio FY, Woode E, Ansah C, Owusu-Daaku FT, et al. Characterization and Treatment of Severe Malaria in Hospitalized Children at a Ghanaian District Hospital. The Open Tropical Medicine Journal, 2009; 2: 39-44.

Tables And Figures

Table 1: Sex-specific Prevalence and trend of Malaria in Under-Five

YEAR	TOTAL NUMBER OF PATIENTS SEEN			MALARIA CASES					PREVALENCE (%)
	Males	Females	Total	Males	% of malaria among males	Females	% of malaria among females	Total	
2012	448	434	884	345	77	336	77.4	681	77.0
2013	407	393	815	297	73	293	74.6	590	72.4
2014	313	294	607	186	59.4	183	62.2	369	60.8
TOTAL	1168	1121	2306	828	70.9	812	72.4	1640	71.1

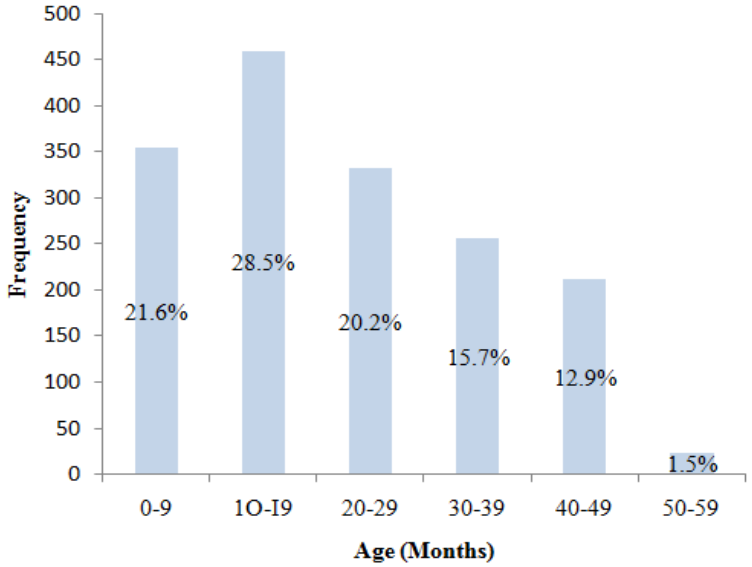

Figure 1: Age-specific distribution of patients diagnosed of malaria

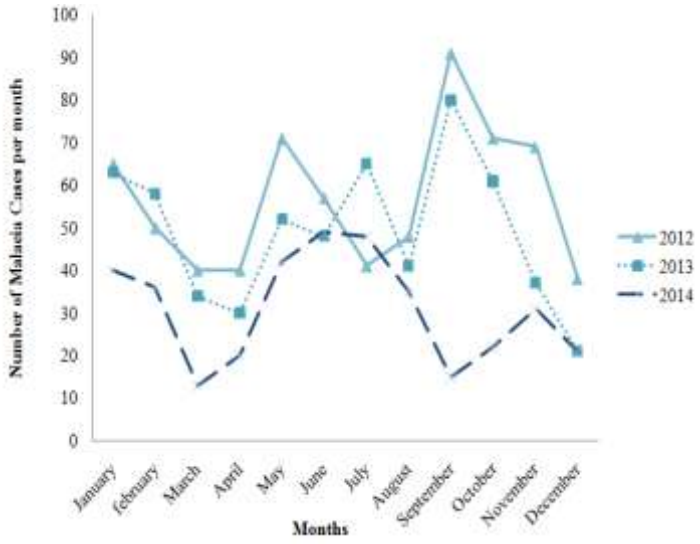

Figure 2: Monthly trend of malaria in 2012, and2014

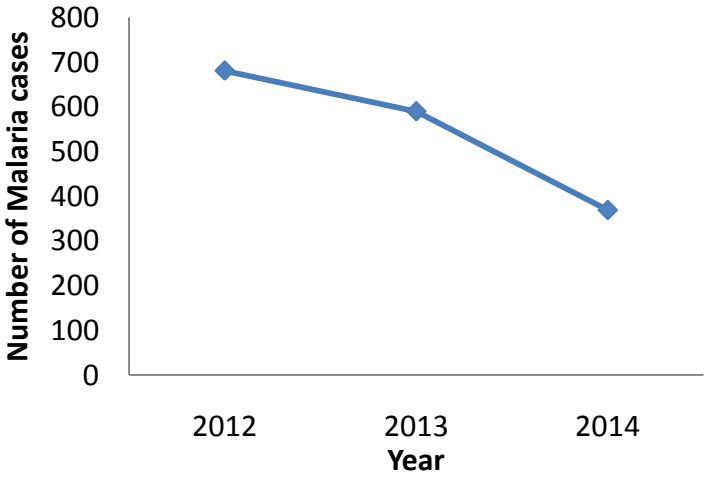

Figure 3: Trend of malaria prevalence 2012 to 2014

TABLE 2: Presenting symptoms of Under-fives diagnosed of malaria**.**

SYMPTOMS	**FREQUENCY N=1640**	**PERCENTAGE (%)**
Fever and other symptoms	1508	92.0
Cough	585	35.7
Vomiting	192	11.7
Catarrh	167	10.2
Fever only	150	10.0
Others*	149	9.1
Diarrhea	147	9.0
Loss of appetite	130	7.9
Headache	108	6.6
Weakness	92	5.6
Cold	83	5.1
Fast breathing	61	3.7
Convulsion	48	2.9
Number of fevers that were not malaria	**42/2306**	**1.8**$^{+}$

*Others include: rashes, abdominal pain, abdominal discomfort, yellowness of urine, boils.
+The proportion of fevers that were not malaria among all the under-five records reviewed.

Table 3: Drug treatments given to those diagnosed of malaria.

DRUGS ADMINISTERED		**FREQUENCY**	**PERCENTAGE (%)**
ACTs Only		358	21.8
ACT + other non-antimalarial drugs		650	39.6
Other antimalarials only			
	Chloroquine	6	0.4
	Artesunate	64	3.9
	Quinine	50	3.1
	Sulphadoxine-pyrimethamine	15	0.9
	Maldox	5	0.3
	Halofanthrine	5	0.3
	Others*	4	0.2
Other antimalarial drugs + other drugs		170	10.4
Non-antimalarial drugs only		187	11.4
No treatment		126	7.7
TOTAL		**1640**	**100**

Others* include malwin, paluther, Artellum, Nartel.

ACTs utilized include coartem, artemether alone, artemether + amodiaquine, artemether + lumefantrine.