Pattern of Malaria Morbidity and Mortality in under-Five Children Attending ONI Memorial Children's Hospital Ibadan, Oyo-State

Ayinde, Abayomi O.
University of Ibadan (Public Health Epidemiology)

Olubukola Alawale
World Health Organizatio Marcus Oluwadare

Adewale Adeloye Idowu
University of Ontario Institute of science and technology Faculty of Health Science

Adefunke Adeshina
Lagos State Ministry of Health

ABSTRACT

Background

Malaria is the most important tropical parasitic disease, as it affects millions of people worldwide, most of whom are children under the age of five years. Therefore, early diagnosis and treatment is recommended for children to prevent the disease from progressing to its severe forms, leading to morbidity and mortality among under-fives. ObjectiveThis study aims to determine the pattern of malaria morbidity and mortality in under-fives who presented at Oni memorial children's hospital during the study period.

Methodology *The study adopted a case review of records of all children who are under-fives in the period of one year (1st January to 31st December 2010) at Oni memorial Children's hospital. A total of 7,720 case files of children all below the age of five who presented both at the outpatient section and the inpatient section were reviewed using a proforma to collect data. A Chi-square test was used for bivariate analyses to test the significance of the association between categorical variables. The level of significance was set at 0.05.*

Results *The mean age of the Neonates was found to be 15.22 ± 6.5 days, post neonates 5.53 ± 3.11 months, early childhood 31.43 ± 14.36 months. Almost two-thirds (60.40%) of the children who presented at the hospital were males, while more than half of the children (57.0%) presented during the wet season compared to those who presented during the dry season. Of the cases reviewed only 18.50% of the children had their immunization dosage up to date, while the majority (83.40%) used analgesics and other drugs such as Vitamin C and Folic acid for treatment before visiting the hospital. Almost half of the children (46.50%) were diagnosed with Malaria and other co-morbid conditions at a presentation at the hospital with the majority of the death (66.70%) among those admitted due to malaria and other co-morbid conditions.*

Conclusion *The study shows that Malaria and other co-morbid conditions are the most important causes of childhood morbidity and mortality among under-five. Therefore, health interventions*

aimed at controlling malaria and its complications should be reinforced if childhood morbidity and mortality are to be considerably reduced.

KEYWORDS: *Malaria, case review, morbidity and mortality.*

Introduction

Malaria is the most common tropical parasitic disease as it affects about 247 million people out of the 3.3 billion people at risk and resulting in nearly a million deaths, most of whom are children under the age of five years (WHO, 2008). Each year, 500 million infections and up to 2.7 million deaths are attributable to malaria (Bremen, 2001) with about 90% of these deaths occurring in children in sub-Saharan Africa (Newton et al., 1998); thereby making it the leading cause of under-five mortality in the region. Pregnant women and their unborn children are also particularly vulnerable to malaria, which is a major cause of prenatal mortality, low birth weight and maternal anaemia. Similarly, malaria accounts for 40% of public health expenditure, 30 - 50% of in-patient admissions and up to 50% of out-patient visits in areas with high malaria transmission (WHO, 2008). Furthermore, out of the 350–550 million malaria cases that are estimated to occur in the world every year (WHO 2005), only around1–2% are severe or life threatening (Carneiro et al., 2005). However, this small proportion represents an enormous malaria death toll per year, especially in sub-Saharan Africa, where more than 90% of the malaria deaths are thought to take place every year, affecting mainly children and pregnant women (WHO 2005; WHO, 2003).

In Nigeria, malaria is endemic and stable, with seasonal variation in different geographic zones of the country. More than 90% of the total population is at risk of malaria and at least 50% of the population suffers from at least one episode of malaria each year. It is estimated that about 100 children under one year and 203 children under-five years out of 1000, respectively, die annually (NDHS, 2003). In other words, one out of every five Nigerian children dies before his/ her fifth birthday (RBM, 2000). Malaria is a major cause of morbidity and mortality, resulting in 25% infant and 30% childhood mortality (FMH, 2005a). Beyond the impact on children and pregnant women, it affects the general population (RBM, 2005 and FMH, 2005b). The disease is the commonest cause of outpatient attendance across all age groups with about 66% of clinic attendance due to malaria (FMH, 2000) and thus constituting a great burden on the economy.

Childhood deaths resulting mainly from cerebral malaria and anaemia constitute nearly 25 % of childhood mortality in Africa. Fatality rates of 10-30% have been reported among children referred to hospital with severe malaria (Parks, 2007). However, these rates are even higher in rural and remote areas where patients have restricted access to adequate treatment (WHO 2005).

The clinical presentation of severe malaria is affected by a number of factors including the genetic characteristics of the population, malaria epidemiology, health-seeking behaviour and non-malaria co-morbidity (Bassat.,et al 2008., Dzeing-Ella et al., 2005; Oduro, et al 2007). Other determinants of malaria severity are age, geographic location and level of transmission (Imbert., et al 1997, WHO, 2000).

Furthermore, poor reporting of deaths, disease and poor surveillance system makes data unavailable. Most times other febrile illnesses in children are accompanied by malaria infection and may make such disease to have poor prognosis. According to Onyiriuka, 2005; hospital admission data can be a valuable tool for assessing the epidemiology of diseases within populations because it is a reflection of the disease affecting individuals within the community, the age at which these conditions occur and the burden on hospital services.

This study was therefore designed to employ secondary data from hospital records to determine the

pattern of malaria of malaria related morbidity and mortality among under- fives presenting in the hospital from January 2010 to December 2010. And the specific objectives are to

1. To determine the hospital prevalence of malaria related illnesses among the under fives
2. To examine the pattern of clinical presentation of malaria in under-fives presenting in the hospital.
3. To identify factors associated with malaria related illnesses and deaths in under-fives presenting in the hospital.
4. To determine the hospital prevalence of malaria related deaths among the under fives

Materials and Methods

Study Area

The study was conducted in Ibadan the capital of Oyo-State, which is one of the largest cities in Africa and the largest in West Africa. The Local Government Area is Ibadan South- West which covers an area of about 133.500 square meters of land with an estimated population of 291,628.The Local Government Area has 10 political wards with 10 State owned health facilities, 11 Primary Health Centers/Maternity center and 127 private health institutions.

Study Location

This study was carried out at Oni Memorial Children's Hospital Ring road Ibadan; a popular and the only secondary health care pediatric hospital in Ibadan which was commissioned on the 10th of may 1985. The hospital caters for the health needs of children within the age bracket 0-11 years. The total number of beds in the hospital is 56 and there are four different departments in the hospital namely, Emergency treatment room which contains 11 beds, ward1 which contains 18 beds, ward 2 which contains 7 beds and premature or neonatal ward which contains 20 beds including incubators and other gadgets. Attendance per month is about 4,900. There was also a laboratory which has chemistry and haematology units and it offers 24 hours service.

Study Population

A review of case records was used as the study design. The population of children in this study consists of all children under the age of five years who reported in the hospital from1st January 2010 to 31st December 2010. A total of 7,720 records of the children who were below the age of five were studied. About 6002 children presented in the outpatient clinic while 1718 were admitted (Inpatients). The inclusion criteria included children under the age of five years with doctor's diagnosis of malaria only or as co-morbid with other illnesses; while children whose diagnoses and outcome are not known would be excluded from the study.

Data collection procedure

The admission registers and case notes of all children under the age of five admitted into the hospital and the pediatric outpatient clinic attendance registers and case notes were examined to obtain data on total number of children seen at the hospital for the one year period from 1st January 2010 to 31st December 2010. About 7,720 case files were reviewed and the relevant information extracted. These include basic clinical and demographic data.

The cases were classified based on forms of malaria presentation. All episodes of malaria in children were reviewed. Among those presenting with severe malaria, those with anemia, cerebral malaria and respiratory distress were considered. Information obtained from the case notes and registers included date of admission, ethnic group, place of residence, age, sex, main diagnosis based on presenting clinical features and laboratory results such as PCV, blood film for malaria parasite.

The outcome of hospitalization such as deaths and discharges were documented for each patient. The cause of death if available will also be documented.

Ethical considerations

Approval for the review of the patient's records was obtained from the Oyo-State Ethical review Committee. Confidentiality was ensured as names of patients were not included in the records obtained. Permission was taken from the Chief Medical Director of the hospital.

Data management and statistical analysis

Data were entered, cleaned, and analyzed using SPSS for Windows (version 17.0). Descriptive statistics were computed such as frequencies, proportions, and means. Chi-Square test was used to determine the association between socio-demographic characteristics and type of clinical diagnosis; it was also used to determine the relationship between sex and types of malaria presentation. $P<0.05$ was considered statistically significant. Trend on distribution of presentation of the children by month of the year was shown on line graphs. In this study, the seasons were defined as the wet season (May to October) and the dry season (November to April) in accordance with the well-known characteristics of the climate of Nigeria (Emielu, 2000; Ojo et al., 2000)

RESULTS

The results of this study are presented in sections. Section one gives detailed information on the socio-demographic characteristics of the under-5's. Section two shows past medical history and clinical history of under-fives presenting in the hospital. Section three provides results on pattern of clinical presentation of malaria in under-fives presenting in the hospital. Section four provides information on hospital prevalence of malaria related deaths (1 January -31 December 2010). Section five provides factors associated with malaria related illnesses and deaths in under fives presenting in the hospital.

4.1 General characteristics of the study participants

A total of 7,720 records of the children who were below the age of five were studied. About 6002 children presented in the outpatient clinic while 1718 were admitted (Inpatients). The general characteristics of the participants are summarized in terms of age, gender, religion, ethnic group, mother's occupation and other characteristics. The results are presented in table1 below.

4.1.1 Socio-Demographic Characteristics

The socio-demographic characteristics of the children studied are presented in Table 1. Among the 7,720 children whose cases were reviewed at the outpatient and inpatient section of the hospital 4660 (60.4%) were males while 3060 (39.6%) were females. Nearly half 3805(49.3%) of the children were aged 12 months to 59 months (Early childhood), while 1519(19.7%) of the children are aged 0-28 days (Neonates). The mean age of the Neonates was found to be 15.22 ± 6.5 days, post neonates 5.53 ± 3.11 months, early childhood 31.43 ± 14.36 months

The two predominant religions of the parents were Christians 5607 (73.3%) and Muslims 2026 (26.5%).

The various ethnic groups represented amongst the children were Yoruba 6657 (86.3%), Igbo789 (10.2%) and Hausa 271 (3.5%).

Majority 1443(71.3%) of the mothers were unskilled, 286 (13.9%) of them were skilled, while 50 (2.5%) of them were professionals.

Three thousand two hundred and sixty nine children (44.8%) who presented were from Ibadan South Local Government Area of the State while those from Iwajowa presented the least 4 (0.1%)

Out of the 7,720 records reviewed, 4,400(57.0%) children presented during the wet season while 3,320 (43.0%) presented during the dry season.

Socio-demographic Characteristics of Subject

Socio-demographic variables	Frequency (%)
Age	
Neonates	1519 (19.7)
Post neonates	2396 (31.0)
Early childhood	3805 (49.3)
Total	7720 (100.0)
Gender	
Male	4660 (60.4)
Female	3060 (39.6)
Total	7720 (100.0)
Religion	
Christianity	5607 (73.3)
Islam	2026 (26.5)
Others	18 (0.2)
Total	7651 (100.0)
Ethnic group	
Yoruba	6657 (86.3)
Igbo	789 (10.2)
Hausa	271 (3.5)
Total	7717 (100.0)
Mother's Occupation	
Unskilled	1443 (71.3)
Skilled	282 (13.9)
Artisan	248 (12.3)
Professionals	50 (2.5)
Total	2023 (100.0)
Season of presentation	
Wet	4400 (57.0)
Dry	3320 (43.0)
Total	7720 (100.0)
Local Government Area of residence	
Ibadan south	3269 (44.8)
Ido	1762 (24.1)
Ibadan North	1294 (17.7)
Oluyole	412 (5.6)
Egbeda	361 (4.9)
Akinyele	131 (1.8)
Lagelu	58 (0.8)
Ona ara	8 (0.1)
Iwajowa	4 (0.1)
Total	7299 (100.0)

Past Medical History and Clinical History

The past medical history of the cases reviewed (7720) describes the immunization history of the

children and treatment prior to hospital visit the result is presented in Table 2.

Among the cases reviewed 1180 (56.5%) of the children used analgesic and others prior to hospital visit, 493 (25.2%) of the children used antibiotics and 359 (18.3%) of the children used anti-malaria.

Immunization history was such that 1431 (18.5%) of the children were up to date, 234 (3.0%) were not up to date, 6050 (78.4%) not available and 5 (0.1%) had no history of immunization. The cases reviewed provide information on the date of presentation of the children. Majority of the cases 859 (11.1%) presented in September (wet season) while 467 (6.0%) presented in December (dry season). About 6002 (77.7%) of the children were managed as outpatients while 1718 (22.3%) were managed as inpatients.

More than half 5745 (74.4%) of the cases reviewed had a history of fever at presentation while 1487 (19.3%) of the children had no history of fever at presentation. Analgesics and other drugs such as vitamin C, folic acid etc had the highest proportion 6436 (83.4%) of use by the children followed Antimalaria drugs 6097 (79.0%) such as Coartesine, chloroquine etc while Antibiotics drug use was the least 5590 (72.4%) such as Fleming, Ocefix etc.

Four hundred and thirty two (71.8%) of the cases reviewed in outpatient were referred, 138 (23.0%) improved and 32 (5.2%) dead. For the cases reviewed in the inpatient section, 1509 (87.8%) were well and discharged, 110 (6.4%) were referred, 36 (2.1%) discharged against medical advice, 63 (3.7%) died.

More children 175(10.2%) were admitted in August, in December the number of admitted cases was the lowest 113(6.6%) compared to those presenting in previous months.

One thousand three hundred and eighty one (80.4%) of the children were admitted for over 48 hours, 227 (13.2%) within 24-47hours and 109 (6.3%) under 24 hours

Past Medical History and clinical history

Clinical details	Frequency (%)
Treatment prior to hospital visit	
Analgesic and others	1108 (56.5)
Antibiotic	493 (25.2)
Antimalaria	359 (18.3)
Total	1960 (100.0)
Immunization history	
Not available	6050 (78.4)
Up to date	1431 (18.5)
Not up to date	234 (3.0)
None	5 (0.1)
Total	7720 (100.0)
History of fever at presentation	
Present	5745 (74.4)
Absent	1487 (19.3)
Total	7720 (100.0)
Type of management	
Out patient	6002 (77.7)
Inpatient	1718 (22.3)
Total	7720 (100.0)
Treatment *	
Analgesic and others	6436 (83.4)

Antimalaria	6097(78.9)
Antibiotics	5590 (72.4)
Outcome of outpatient	
Dead	32 (5.2)
Referred	432 (71.8)
Improved	138 (23.0)
Total	602 (100.0)
Duration of admission	
Under 24 hours	109 (6.3)
24 – 47 hours	227 (13.2)
48 hours and above	1381 (80.4)
Total	1718 (100.0)
Outcome of admission of inpatient	
Well and discharged	1509 (87.8)
Referred	110 (6.4)
Death	63 (3.7)
Discharged against medical advice	36 (2.1)
Total	1718 (100.0)

***multiple responses recorded**

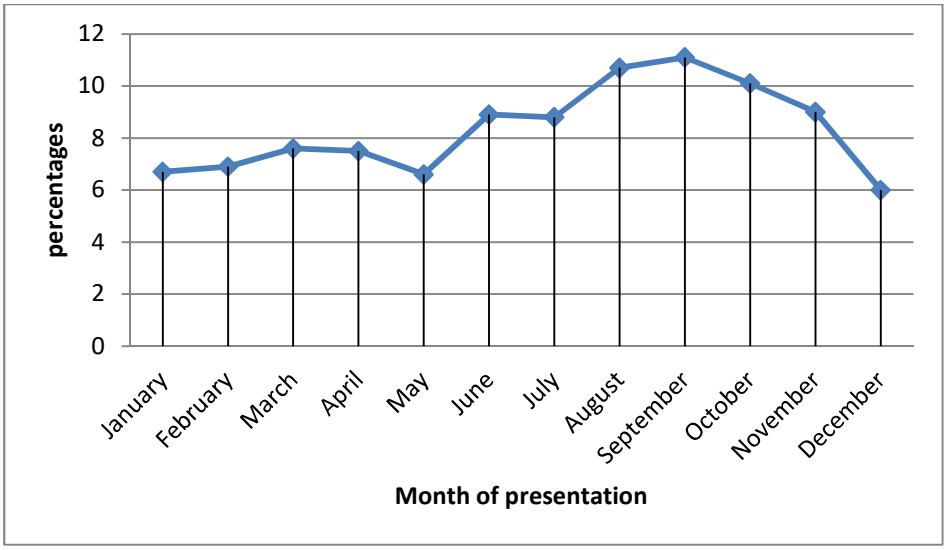
Clinical diagnosis

Malaria was recorded as the only diagnosis for 2351 (30.5%), malaria and co-morbidity 3592 (46.5%) and other illnesses 1777 (23.0%) of the cases and the leading associated diagnosis with upper respiratory track infection (11.6%), gastroenteritis (7.3%) and respiratory track infection (5.8%) indicating that malaria was the principal diagnosis in most instances. Out of 5943 malaria cases reviewed, 5610 (94.4%) presented with uncomplicated malaria, 333 (5.6%) were complicated. Sixty three deaths were recorded for inpatient of which 42 (66.7%) of the deaths was due to malaria and other illnesses, 12 (19.0 %) was due to other illnesses 9 (14.3%) was due to malaria alone

Clinical diagnosis and outcome

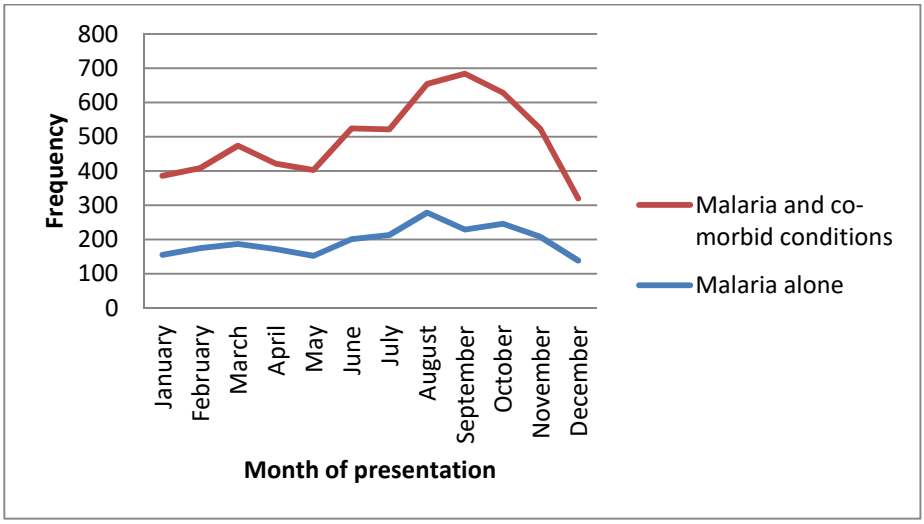
Clinical diagnosis (1)	
Malaria Alone	2351 (30.5)
Malaria and co-morbid conditions	3592 (46.5)
Other diagnosis	1777 (23.0)
Total	7720 (100.0)
For malaria state type	
Uncomplicated	5610 (94.4)
Complicated	333 (5.6)
Total	5943 (100.0)
If outcome is death, cause of death (inpatient)	
Malaria and co-morbid conditions	42 (66.7)
Other illnesses	12 (19.0)
Malaria alone	9 (14.3)
Total	63 (100.0)

Distribution of presentation of the children by month of the year



November - April (dry season) **May – October (wet season)**

Relationship between month of presentation and clinical diagnosis of under-fives



ASSOCIATION BETWEEN SOCIO DEMOGRAPHIC CHARACTERISTICS AND TYPE OF CLINICAL DIAGNOSIS IN UNDER-FIVES

Association between socio demographic characteristics and all clinical diagnosis

More males presented with malaria 1428(39.5%), malaria and other illnesses 2187(60.5%), than females 923(39.6%), 1405(60.4). Majority of the children who presented with malaria alone were early childhood1202 (39.6%) compared with post neonates 693 (38.3%) and neonates 456(41.6%) P>0.05 (see table 4) More than half of the mothers whose children presented with malaria and it's co morbid conditions were unskilled 855(71.7%) compared with those whose mother's were skilled 126 (58.1%),artisans 111 (55.2%) and professionals (61.0). Mothers who were unskilled had more children who presented with malaria alone 337(28.3%) compared with those that were skilled 91(41.9%), artisans 90 (44.8%) and professionals 16 (39.0%) which was also significant. More children whose parent's were Christians presented with malaria and it's co-morbid conditions 2590 (60.1%), malaria alone 1716 (39.9%), compared with those whose parents were Muslims P>0.05. most of the children from Ibadan south 978(38.9%) presented with malaria alone, malaria and its co-

morbid conditions 1535(61.1%) and compared with those from other local governments P>0.05.

Majority of the children presented in the wet season with malaria and co-morbid conditions 2114 (61.3), malaria alone 1334(38.7%) compared with those presenting with those illnesses in the dry season and this is not significant (P>0.05).

Socio demographic characteristics and Type of clinical diagnosis

Relationship between sex and types of malaria in under-fives

Socio demographic characteristics	Type of clinical diagnosis		N (%)	X^2	P value
	Malaria (%)	Malaria and co-morbid conditions (%)			
Sex					
Male	1429 (39.5)	2187 (60.5)	3615 (100.0)	0.013	0.911
Female	923 (39.6)	1405 (60.4)	2328 (100.0)		
Age					
0-28days	456 (41.6)	639 (58.4)	1095 (100.0)	3.174	0.205
>28days-11months	693 (38.3)	1116 (61.7)	1809 (100.0)		
12months-59months	1202 (39.6)	1837 (60.4)	3039 (100.0)		
Mothers Occupation					
Skilled	91 (41.9)	126 (58.1)	217 (100.0)		
Artisan	90 (44.8)	111 (55.2)	201 (100.0)		
Unskilled	337 (28.3)	855 (71.7)	1192 (100.0)	33.189	0.000
Professional	16 (39.0)	25 (61.0)	41 (100.0)		
Religion					
Christianity	1716 (39.9)	2590 (60.1)	4306 (100.0)		
Islam	609 (38.7)	963 (61.3)	1572 (100.0)	1.232	0.540
Others	7(50.0)	7 (50.0)	14 (100.0)		
Local government area of residence					
Akinyele	46(47.4)	51 (52.6)	97 (100.0)		
Ibadan north	404 (40.3)	598 (59.7)	1002 (100.0)		
Ibadan south	978 (38.9)	1535 (61.1)	2513 (100.0)	6.864	0.551
Ido	537 (39.4)	826 (46.4)	1363 (100.0)		
Egbeda	107(39.1)	167 (60.9)	274 (100.0)		
Oluyole	121 (38.1)	197 (61.9)	318 (100.0)		
Lagelu	21(47.7)	23 (52.3)	44 (100.0)		
Iwajowa	3(75.0)	1 (25.0)	4 (100.0)		
Ona ara	3(37.5)	5 (62.5)	8 (100.0)		
Season of presentation					
Wet	1334(38.7)	2114(61.3)	3448(100.0)	2.600	0.107
Dry	1017(40.8)	1478(59.2)	2495(100.0)		

There were more uncomplicated malaria cases among the females 2199 (94.5%) when compared to the males 3411 (94.4%) while there were more complicated malaria cases among the males 204 (5.6%) compared to the females 129 (5.5%). This trend however appears not to be significant (P>0.05)

Relationship between sex and types of malaria in under-fives

Sex	Types of malaria		N (%)	X^2	P value
	Uncomplicated (%)	Complicated (%)			
Male	3411 (94.4)	204 (5.6)	3615 (100.0)	0.138	0.710
Female	2199 (94.5)	129 (5.5)	2328 (100.0)		
Total	5610 (94.4)	333 (5.6)	5943 (100.0)		

Majority of the post neonates (94.6%) presented with uncomplicated malaria cases and neonates (93.9%). Complicated malaria cases was such that the highest proportion who presented were neonates, followed by early childhood (5.5%) while post neonates presented the least (5.4%) (P>0.05).

Relationship between age and types of malaria in under-fives

Age	Types of malaria		N (%)	X^2	P value
	Uncomplicated (%)	Complicated (%)			
0-28days	1028 (93.9)	67 (6.1)	1095 (100.0)	0.701	0.704
>28days-11mnths	1711 (94.6)	98 (5.4)	1809 (100.0)		
12mnths-59mnths	2871 (94.5)	168 (5.5)	3039 (100.0)		
Total	5610 (94.4)	333 (5.6)	5943 (100.0)		

Relationship between age and presentation of malaria and its co-morbid conditions

Half of the children 450 (50.9%) presenting with malaria and upper respiratory tract infection belong to the early childhood group while (16.6%) of neonates presented with malaria and upper respiratory tract infection (P>0.05).

Relationship between age and presentation of malaria and its co-morbid conditions

Age	Malaria and it's co-morbid conditions							N (%)	X^2	P value
	Malaria and URTI	Malaria and GET	Malaria and RTI	Malaria and Sepsis	Malaria and B/pneumonia	Malaria and Diarrhea	Malaria and Others			
(0-28days)	147(25.7)	93(16.3)	72(12.6)	51(8.9)	20(3.5)	23(4.0)	165(28.9)	571(100)	19.5	
(>28days-11mnths)	287(28.2)	203(20.0)	125(12.3)	96(9.4)	27(2.7)	29(2.9)	250(24.6)	1017(100)		
(12months-59months)	450(27.0)	257(15.4)	232(13.9)	158(9.5	40(2.4)	74(4.4)	458(27.4)	1669(100)		
Total	884(27.1)	555(17.3)	429(13.2)	305(9.4	87(2.7)	126(3.9)	873(26.3)	3257(100)		

P value= 0.070

Relationship between age and morbidity by type of diagnosis (out patient and inpatients)

Out of all the 6002 children who presented in the outpatient section those that were neonates 26

(44.1%) had malaria alone, 33 (55.9%) presented with malaria and other co-morbid conditions. 63 (70.8%) of post neonates presented with malaria and other co-morbid conditions 84 (65.2%) of neonates presented with malaria and other co-morbid conditions (p>0.05)

Of all 1718 under fives who presented in the inpatient section (45.9%) of the neonates had malaria alone while (60.3%) of those who were within the age group of post neonates presented with malaria and other illness (P>0.05).

Relationship between age and morbidity by type of diagnosis (inpatient and outpatients)

Age	Number of morbidity		N (%)	X^2	P value
Outpatient	**Malaria (%)**	**Malaria and co-morbid conditions (%)**			
0-28days	26 (44.1)	33 (55.9)	59 (100.0)	3.445	0.179
>28days-11mnths	26 (29.2)	63 (70.8)	89 (100.0)		
12mnths-59mnths	47 (34.8)	84 (65.2)	135 (100.0)		
Total	99 (35.0)	184 (65.0)	283 (100.0)		
In patient	**Number of morbidity**				
0-28days	68 (45.9)	80 (54.1)	148 (100.0)	1.689	0.430
>28days-11mnths	149 (39.7)	226 (60.3)	375 (100.0)		
12mnths-59mnths	323 (41.4)	457 (58.6)	780 (100.0)		
Total	540 (41.4)	763 (58.6)	1303 (100.0)		

ASSOCIATION BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS MORBIDITY AND MORTALITY IN UNDER-FIVES

Association between socio demographic characteristics, morbidity and Mortality in outpatients

More males than females who presented in the outpatient section died and this difference is not significant. Thirteen (8.6%) of the neonates who presented in the outpatient section died compared to post neonates (4.0%) and early childhood (4.4%) P>0.05

Mothers whose occupation was unskilled had more children who died (5.2%) compared to those who were skilled (5.3%) P>0.05. More Christians than Muslims died over the period of study and this difference is not statistically significant.

Majority (5.6%) of the children who died were from Ibadan south local government area compared with those from other local government areas. P>0.05

Table 9: Socio demographic characteristics and outcome variable in the outpatients

Socio demographic characteristics (outpatient)	Dead (%)	Not dead (%)	N (%)	X^2	P value
Sex					
Male	21 (6.0)	328 (90.4)	349 (100.0)	0.812	0.367
Female	11 (4.3)	242 (95.7)	253 (100.0)		
Age					
0-28days	13 (8.6)	138 (91.4)	151 (100.0)	4.383	0.112
>28days-11months	8 (4.0)	193 (96.0)	201 (100.0)		
12months-59months	11 (4.4)	239 (95.6)	250 (100.0)		
Mothers Occupation					
Skilled	1 (5.3)	18 (94.7)	19 (100.0)		
Artisan	0 (0.0)	23 (100.0)	23 (100.0)	1.417	0.702
Unskilled	5 (5.2)	91 (94.8)	96 (100.0)		
Professional	0 (0.0)	3 (100.0)	3 (100.0)		
Religion					
Christianity	24 (5.5)	410 (94.5)	434 (100.0)		
Islam	8 (5.1)	149 (94.9)	157 (100.0)	0.157	0.924
Others	0 (0.0)	2 (100.0)	2 (100.0)		
Local government area of residence					
	1(5.6)	17(94.4)	18 (100.0)		
Akinyele	5 (5.8)	81 (94.2)	86 (100.0)		
Ibadan north	15(5.6)	251 (94.4)	266 (100.0)		
Ibadan south	4 (3.3)	119(96.7)	123 (100.0)	2.526	0.961
Ido	2 (6.3)	30 (93.8)	32 (100.0)		
Egbeda	3 (9.1)	30 (90.9)	33 (100.0)		
Oluyole	0(0.0)	5 (100.0)	5(100.0)		
Lagelu	0(0.0)	1(100.0)	1(100.0)		
Iwajowa	0(0.0)	1(100.0)	1(100.0)		
Ona ara					
Season of presentation					
Wet	16 (4.5)	337 (95.5)	353 (100.0)	1.040	0.308
Dry	16(6.4)	233 (93.6)	249(100.0)		

Association between socio demographic characteristics, morbidity and Mortality in inpatients

Out of all the under-fives who presented in the inpatient section, there was no significant difference in the morbidity and mortality outcomes of the males compared to females P>0.05. The highest proportion of those who presented with morbidity were early childhood followed by the post neonates and then neonates but more neonates died when compared to the other ages. The difference was however significant P<0.001

More children presented with morbidity and mortality with mothers who were professionals having the highest proportion compared to other occupation this trends appears to be significant p =0.002

There was no significant difference between the morbidity and mortality that was observed among the Christians compared to the Muslims.

Most of the children who had the highest proportion of morbidity and mortality were from Ibadan

south local government area when compared to those from other local government area. This is not statistically significant also more children presented with morbidity than mortality during the wet season compared to dry season. P>0.05

Socio demographic characteristics and outcome variable in inpatients

Socio demographic characteristics (Inpatient)	Dead (%)	Not dead (%)	N (%)	X^2	P value
Sex					
Male	40 (3.8)	1003 (96.2)	1043 (100.0)	0.212	0.645
Female	23 (3.4)	652 (96.6)	675 (100.0)		
Age					
0-28days	17 (8.1)	194 (91.9)	211 (100.0)	16.630	0.000
>28days-11months	22 (4.3)	487 (95.7)	509 (100.0)		
12months-59months	24 (2.4)	974 (97.6)	998 (100.0)		
Mothers Occupation					
Skilled	7 (14.3)	42 (85.7)	49 (100.0)		
Artisan	2 (3.8)	50 (96.2)	52 (100.0)	20.692	0.000
Unskilled	4(1.6)	249 (98.4)	253 (100.0)		
Professional	0 (0.0)	22 (100.0)	22 (100.0)		
Religion					
Christianity	44 (3.5)	1210 (96.5)	1254 (100.0)		
Islam	19 (4.2)	431 (95.8)	450 (100.0)	0.551	0.759
Others	0 (0.0)	2 (100.0)	2 (100.0)		
Local government area					
Akinyele	1 (3.3)	29 (96.7)	30 (100.0)		
Ibadan north	9 (3.2)	269 (96.8)	278 (100.0)		
Ibadan south	26(3.6)	703 (96.4)	729 (100.0)		
Ido	21(5.3)	376(94.7)	397 (100.0)	5.217	0.633
Egbeda	2 (2.7)	72 (97.3)	74 (100.0)		
Oluyole	1 (1.1)	86(98.9)	87 (100.0)		
Lagelu	1(7.1)	13 (92.9)	14(100.0)		
Ona ara	0(0.0)	2(100.0)	2(100.0)		
Season of presentation					
Wet	34 (3.6)	920 (96.4)	954 (100.0)	0.065	0.799
Dry	29(3.8)	735 (96.2)	764(100.0)		

Age and association with mortality of clinical diagnosis in under-fives

Out of all the under-fives presenting in the outpatient section of the hospital, 5 (100.0%) of the post neonates died from malaria and co morbid conditions, while (20.0%) of those in the early childhood group died as a result of malaria alone. About (89.5%) of post neonates presenting in the inpatient section died as a result of malaria and co-morbid conditions, (21.4%) of post neonates died as a result of malaria (P>0.05).

Age distribution and clinical diagnosis of mortality in under- five

Age	Number of mortality		N (%)	X^2	P value
Outpatient	**Malaria (%)**	**Malaria and co-morbid conditions (%)**			
0-28days	0 (0.0)	4 (100.0)	4 (100.0)	2.012	0.366
>28days-11months	0 (0.0)	5 (100.0)	5 (100.0)		
12months-59months	2 (20.0)	8 (80.0)	10 (100.0)		
Total	2 (10.5)	17 (89.5)	19 (100.0)		
In patient	**Number of mortality**				
0-28days	3 (21.4)	11 (78.6)	14 (100.0)	1.044	0.593
>28days-11months	2 (10.5)	17 (89.5)	19 (100.0)		
12months-59months	2 (10.5)	17 (89.5)	19 (100.0)		
Total	7 (13.5)	45 (86.5)	52 (100.0)		

Association between time of admission and outcome of clinical diagnosis in the under-fives

Most of the cases reviewed showed that the cause of death for children who died under 24 hours was malaria and co morbid conditions (80.0%) while those whose cause of death was malaria alone died after 48hours (13.5%). For those who died after 2 days malaria alone was the cause of death in (13.2%) of the children. 82 (47.1%) of the children admitted between 24-47 hours presented with malaria alone, (59.5%) of those who were admitted under 24hours presented with malaria and co-morbid conditions.(P>0.05)

Time between admission and outcome of clinical diagnosis

Time of admission	Clinical diagnosis		N (%)	X^2	P value
Dead	**Malaria (%)**	**Malaria and co morbid conditions (%)**			
Under 24 hours	2 (20.0)	8 (80.0)	10 (100.0)	0.992	0.609
24-47 hours	0 (0.0)	4 (100.0)	4 (100.0)		
48 hours and above	5 (13.2)	33 (86.8)	38 (100.0)		
Total	7 (13.5)	45 (86.5)	52 (100.0)		
Not dead	**clinical diagnosis**				
Under 24 hours	32 (40.5)	47 (59.5)	79 (100.0)	2.643	0.267
24-47 hours	82 (47.1)	92 (52.9)	174 (100.0)		
48 hours and above	426(40.6)	623 (57.9)	1049 (100.0)		
Total	540(41.5)	762 (58.2)	1302 (100.0)		

Relationship between time of admission and mortality by age group in under-fives

Out of those who were neonates, 6 (50.0%) of them died under 24 hours compared to post neonates and neonates, 4 (80.0%) of those in early childhood died between 24 – 47 hours while 18 (39.1%) died above 48 hours. P >0.05

Time between admission and mortality by age group

Time of admission	Age			N (%)	X^2	P value
	0-28days (%)	>28days-11months(%)	12months-59months(%)			
Under 24 hours	6 (50.0)	3 (25.0)	3(25.0)	12 (100.0)	7.617	0.107
24-47 hours	0 (0.0)	1 (20.0)	4 (80.0)	5 (100.0)		
48 hours and above	11 (23.9)	18 (39.1)	17 (37.0)	46 (100.0)		
Total	17 (27.0)	22 (34.9)	24 (38.1)	63 (100.0)		

DISCUSSION

SOCIO DEMOGRAPHIC CHARACTERISTICS OF UNDER-FIVES

The highest proportion of the children who presented were aged 12 months to 59 months (Early childhood) followed by those aged >28days-11months (Post-neonates) and the least were those aged 0-28 days (Neonates). This is because at this period of life the passively acquired maternal immunity is already weaning and the child is still developing his/ her own natural immunity. As a result, the child is susceptible to various infections such as malaria

The mean age of the Neonates was found to be 15.22 ± 6.5 days, post neonates 5.53 ± 3.11 months, early childhood 31.43 ± 14.36 months. Ibadan South Local Government Area had the highest proportion of presentation compared to Iwajowa where there was a low turn out.

Mothers whose children had the highest proportion of presentation were unskilled, followed by those who were skilled, while those who were professionals had the least.

More than half of the children (57.0%) children presented during the wet season especially when compared to those who presented during the dry season.

PAST MEDICAL AND CLINICAL HISTORY

Among the cases reviewed, children who used Analgesics in combination with other drugs were more 6436 (83.4%) than those who used antimalarias 6097(78.9) and antibiotics 5590(72.4).

The Immunization history was such that a lower proportion was up to date when compared to those not available which was the highest. It may be possible that only few doctors asked about their immunization history. Majority of the cases presented in September (wet season) when compared to those who presented in December (dry season). More than half of the children were managed as outpatients compared to those managed as inpatients. This may be because the children presented with conditions which does not require admissions and few mothers may actually want their children to be hospitalized.

Malaria was recorded as the only highest clinical diagnosis and the leading associated diagnosis was upper respiratory tract infection followed by gastroenteritis and the least was respiratory tract

infection indicating that malaria was the principal diagnosis in most instances. This was however consistent with similar studies conducted in Kinshasa, Zaire and in Benin city Nigeria. (Greenberg et al 1989 and Onyiriuka, 2005) Out of the malaria cases reviewed uncomplicated malaria was the highest among all the presentation compared to complications with respiratory distress, severe anemia and cerebral malaria having the least. There was more morbidity than mortality outcomes among the children who presented. A high proportion of children were hospitalized for over 48hours when compared to others.

PATTERN OF CLINICAL PRESENTATION OF MALARIA IN UNDER-FIVES

The prevalence of malaria in this study was found to be 30.5%. This prevalence is lower than that reported by Akinbo et al 2009 in Benin city. The children in their early childhood presented more with malaria and other illness and also with malaria alone compared with other age groups.George et al., 2009 and Akinbo et al 2009 reported similar findings but with the rate of admission. More males presented with all the different types of clinical diagnosis than females during the period of this review this however consistent with what was found by Quicke et al 2008. It is possible that parents have a higher tendency to accept hospital care for their ill sons than for their ill daughters. This is probably because of the cultural parental preference for male children.

There was no significant difference between the presentations of the clinical diagnosis such as malaria and malaria alone and the season of presentations. This was not consistent with the findings from a similar study by onyiriuka, 2005. Children who belonged to the early childhood group presented with malaria and upper respiratory tract infection when compared to neonates (P>0.05).

A slightly more than half of neonates presenting in the inpatient section died as a result of malaria and it's co-morbid conditions, compared to post neonates who died as a result of malaria alone and of those in the early childhood group died due to other illnesses. This was however not significant and not consistent with similar study conducted in University of Benin (onyiriuka, 2005)because majority presented with acute lower respiratory tract and also the study conducted in the university of Portharcourt with HIV/AIDS as the commonest (George et al., 2009).

ASSOCIATION BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS MORBIDITY AND MORTALITY IN UNDER-FIVES

There was no significant association between selected socio demographic characteristics and presentation of all types of clinical diagnosis except for the mother's occupation where majority of the children who presented with malaria alone were early childhood compared with post neonates and neonates. More than half of the mothers whose children presented with malaria and other illnesses were unskilled compared with those whose mother's were skilled, artisans and professionals. Also more children presented with malaria and other illnesses in the wet season than in the dry season. This could be as a change in the climate. The leading role of malaria as a cause of childhood hospitalization and mortality in this study has also been documented by other investigators in Nigeria (Lawal and Temiye 1998).

Out of all the under-fives who presented in the inpatient section, there was no significant difference in the morbidity and mortality outcomes except for those who presented with morbidity in early childhood followed by the postneonates and then neonates but more neonates died when compared to the other ages. More children presented with morbidity and mortality with mothers who are professionals in their occupation having the highest proportion compares to other occupation this trends appears to be significant. This could be as a result of the careers of the mothers which may not afford them the time to take care of their wards at the appropriate time.

CONCLUSION

This study shows that age groups of the children and mother's occupation is a major predictor for mortality and morbidity for presentation of the under-fives to the hospitals. The five target diseases include respiratory infections, diarrhoea, measles, malaria and malnutrition, anaemia may be nutritional), if not all some of which was found to be important causes of childhood deaths in this study series. Other child health interventions such as the immunization programme, oral re-hydration therapy and the baby-friendly hospital initiative are all steps in the right direction.

With sincerity and commitment in their implementation by government as well as by health care planners and managers, childhood mortality rate will be substantially reduced in Nigeria.

RECOMMENDATION

Government agencies should work hand in hand with health agencies to provide the needed awareness by care givers to ensure that prompt treatment is given to children in the health facilities when they present.

REFERENCES

1. Adebola EO, Olukemi KA, Peter EO and Olayemi O O; Early home treatment of childhood fevers with ineffective antimalarials is deleterious in the outcome of severe malaria
2. Agomo CO, Oyibo WA, Anorlu RI, Agomo PU (2009). Prevalence of Malaria in Pregnant Women in Lagos, South-West Nigeria. Korean J.Parasitol. 47(2): 179-183.
3. Ajayi IO, Falade CO, Bamgboye AE, Oduola AM, Kale OO (2008): Assessment of a treatment guideline to improve home management of malaria in children in rural south-west Nigeria. Malar J, 7:24.
4. Ajayi IO, Falade CO (2006): Pre-hospital treatment of febrile illness in children attending the General Outpatients Clinic, University College Hospital, Ibadan, Nigeria. Afr J Med Med Sci, 35:85-91.
5. Akinbo, Richard Omoregie, et al, Prevalence of Malaria and Anemia Among Young Children in a Tertiary Hospital in Benin City, Edo State, Nigeria
6. Akpele GO, Abiodun PO, Sykes RM (1993): Acute fevers of unknown origin in young children in the tropics. The journal of pediatrics 1993, 122 (1): 79-81
7. Alphey, L (2002). Malaria control with genetically manipulated insect vectors. Science, **298**, 119 – 121.
8. Amexo M, Tolhurst R, Barnishi G, Bates I (2004): Malaria misdiagnosis : effects on the poor and vulnerable. The Lancet, 364 (9448): 1896-1898.
9. Amuge B, Wabwire-Mangen F, Puta C, Pariyo GW, Bakyaita N, Staedke S, Kamya M, Okui O: Health-seeking behavior for malaria among child and adult headed households in Rakai and Health Survey, p. 10.
10. Anderson, R.A., Knols, B.G., Koella, J.C (2000). *Plasmodium falciparum* sporozoites increase feeding-associated mortality of their mosquito hosts *Anopheles gambiae* s.l. Parasitology, **120,** 329-333 .
11. Ansah EK, Gyapong JO, Agyepong IA, Evans DB (2001): Improving adherence to malaria treatment for children: the use of prepacked chloroquine tablets vs. chloroquine syrup. *Trop Med Int Health*, 6:496-504. Available from: http://www.who.int/inf-fs/en/fact094.html [29-03-01]

12. Ayinde et al 2021 pattern of malaria presentation in under-fives in Ibadan, Oyo State, Nigeria.
13. Bassat Q, Guinovart C, Sigaúque B (2008). Malaria in rural Mozambique. Part II: children admitted to hospital. Malar J; 7: 37-50.
14. Berkeley Ja, Maitland K, Mwangi I, Ngetsa C, Mwarumba S, Lowe BS, Newton CR, Marsh K, Scott JA (2005), English M: use of clinical syndromes to target antibiotic prescribing in seriously ill children in malaria endemic area : Observational study BMJ, 330 (7498):99
15. Berkley J, Mwarumba S, Bramhan K, Lowe B Marsh K (1999): Bacteraemia complicating severe malaria in children. Trans R Soc Trop med Hyg, 93 (3): 283-286
16. Besansky, N. J., Hill, C. A., Costantini, C (2004). No accounting for taste: host preference in malaria vectors. TRENDS in Parasitology, vol.not known (in press). p
17. Boivin MJ (2002). "Effects of early cerebral malaria on cognitive ability in Senegalese children". *J Dev Behav Pediatr* **23** (5): 353–64. PMID 12394524. http://meta.wkhealth.com/pt/pt-core/template-journal/lwwgateway/media/landingpage.htm?issn=0196-206X&volume=23&issue=5&spage=353
18. Bozdech, Z., Llinas, M., Pulliam, B.L., Wong, E.D., Zhu, J., DeRisi, J.L (2003). The transcriptome of the intraerythrocytic developmental cycle of *Plasmodium falciparum*. PLOS Biology, **1**, 85 – 100.
19. Bradley, T. (1996) *History of Plasmodium Parasites* [Online]. University of Leicester. Available from:http://www-micro.msb.le.ac.uk/224/Bradley/History.html
20. Bremen JG (2001). The ears of hippopotamus: manifestations, determinants and estimates of the malaria burden. *Am J Trop Med Hyg* ;64(Suppl 1−2):S1−11.
21. Budiansky, S (2002). Mosquitoes and disease. Science, **298**, 82-86.
22. Carneiro I, Roca-Feltrer A, Schellenberg J: Estimates of the burden of malaria morbidity in Africa in children under the age of five years. Child Health Epidemiology Reference Group Change. Contribution of Working Group II to the Second Assessment Report of Christopher Ehis Okaka; Prevalence of Malaria and Anemia Among Young Children in a Tertiary Hospital in Benin City, Edo State, Nigeria
23. Cochran WG (1999). Sampling Techniques. 3rd Ed. John Wiley & Sons, London, pp. 72-82.
24. Dzeing-Ella A, Nze Obiang PC, Tchoua R. S (2005). Severe falciparum malaria in Gabonese children: clinical and laboratory features. Malar J 2005; 4: 1-9.
25. Emielu SA (Ed) (2000). Senior Secondary Geography. Ilorin: Geographical Bureau Nigeria Ltd, 170–172.
26. Falade C, Mokuolu O, Okafor H, Orogade A, Falade A, Adedoyin O, Oguonu T, Aisha M, Hamer DH, Callahan MV (2008). Epidemiology of congenital malaria in Nigeria: a multi-centre study. Trop. Med. Int.Health, 12(11): 1279-1287.
27. Federal Ministry of Health, Nigeria, (1996). Epidemiology and control of malaria. Report on malaria situation in Nigeria. (unpublished document). pp: 80
28. Fegan GW, Noor AM, Akhwale WS, Cousens S, Snow RW: Effect of expanded insecticide-treated bednet coverage on child survival in rural Kenya: a longitudinal study.
29. FMH (2000). Malaria Situation Analysis. Federal Ministry of Health. Publication of the FMH, Nigeria: Abuja, Nigeria; p. 23.

30. FMH (2005a). National Treatment Guidelines Federal Ministry of Health. Publication of the FMH, Nigeria, p. 44.

31. FMH (2005b). Malaria Desk Situation Analysis Federal Ministry of Health. Publication of the FMH, Nigeria

32. Franco Pagnoni(2006) ; Bringing effective malaria therapy to people's door steps; Home management of malaria

33. Gardner, M.J (2002). Genome sequence of the human malaria parasite *Plasmodium falciparum*. Nature, **419**, 498 -511.

34. Gardner, M.J (2002). The genome of the malaria parasite. Current opinion in Genetics and Development, **9**, 704 – 708.

35. Genton B, al-Yaman F, Alpers MP, Mokela D (1997). Indicators of fatal outcome in paediatric cerebral malaria: a study of 134 comatose Papua New Guinean children. Int J Epidemiol; 26: 670-6.

36. George I.O, B. A. Alex-Hart, A. I. Frank-Briggs Mortality Pattern in Children: A Hospital Based Study in Nigeria www.ijbs.org Int J Biomed Sci 5: 4 369-372.g

37. Gomes M, Wayling S, Pang L (1998): Interventions to improve the use of antimalarials in south-east Asia: an overview. Bull World Health Organ, 76(Suppl 1):9-19.

38. Good, M.F (2001). Towards a blood-stage vaccine for malaria: are we following all the leads? Nature reviews, **1**, 117 – 125 .

39. Greenwood B, Mutabingwa T (2002). "Malaria in 2002". *Nature* **415** (6872): 670–2. doi:10.1038/415670a. PMID 11832954.

40. Greenwood BM, Bojang K, Whitty CJ, Targett GA (2005). "Malaria". *Lancet* **365** (9469): 1487–1498. doi:10.1016/S0140-6736(05)66420-3. PMID 15850634.

41. Grover-Kopec E, Kawano M, Klaver R, Blumenthal B, Ceccato P, Connor S (2005). "An online operational rainfall-monitoring resource for epidemic malaria early warning systems in Africa". *Malar J* **4**: 6. doi:10.1186/1475-2875-4-6. PMID 15663795.

42. Gupta, S., Snow, R.W., Donnelly, C.A., Marsh, K., Newbold, C. Immunity to non-cerebral severe malaria is acquired after one or two infections. Nature, **5**, 340 – 343 (1999).

43. Gwer S, Newton C, Berkley JA (2007) .Over diagnosis and co-morbidity of severe malaria in African children: A guide for clinicians. The American journal of tropical medicine and Hygiene, 77(6 suppl) : 6

44. Hahn, M.W., Nuzhdin, S.V (2004). The fixation of malaria refractoriness in mosquitoes.

45. Hamel MJ, Odhacha A, Roberts JM, Deming MS (2001): Malaria control in Bungoma District, Kenya: a survey of home treatment of children with fever, bednet use and attendance at antenatal clinics. Bull World Health Organ, 79:1014-1023.

46. Hay S, Guerra C, Tatem A, Noor A, Snow R (2004). "The global distribution and population at risk of malaria: past, present, and future". Lancet Infect Dis **4** (6): 327–36. doi:10.1016/S1473-3099(04)01043-6. PMID 15172341.