

**EPIDEMIOLOGICAL STUDY OF CHILDHOOD MALARIA IN MBAISE  
IMO STATE**

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**Abstract**

This investigation was carried out to evaluate the epidemiology of childhood malaria in Mbaise between January and November, 2009. Thin smear and Giemsa staining technique was used for malaria parasite examination. Oral interviews and participant observation techniques were used to collect data while analysis of selected Hospital records was also done. Out of the 1,500 children that were tested for malaria parasite, 1065 (71%) were positive while 435 (29%) were examined negative. About 500 samples were collected from each Local Government Area. 280 (56%) were positive in Aboh Mbaise, 365(75%) were positive for Ahiazu Mbaise. 420 (94%) were positive in Ezinihitte Mbaise. In about 15% of the test population, plasmodium was susceptible to chloroquine while about 78% were resistant to it. Out of 10 absentees in a school or office, 8 were due to malaria, it continues to take a lead to health problems in the study area imposing negative impact on the economy, social, education and well being of individuals

Key words: childhood, epidemiological, malaria, Mbaise Imo State

**INTRODUCTION**

Malaria is a vector borne disease of public health concern caused by the bite of the female anopheles mosquito infected by a malaria parasite – plasmodium. It is prevalent in many regions of developing nations (WHO 2014). The world affecting more than half of the world's population (Msangeni *et al.*, 2011). The interaction between man and mosquito is a major fact in its transmission and persistence. In developing countries like Nigeria where poverty ravages, the domestic environment remains a major factor in ill health, linked with inadequate basic sanitation, ideal housing and proper waste disposal, on which the control of epidemics largely depends. Each year, up to five billion episodes of clinical illness that require antimalarial therapy occurs throughout the world, claiming about three million lives (Oduro *et al.*, 2007). Nigeria account for about 3% of this global estimate.

Recent data exist on these increasing prevalence of malaria epidemic in Nigeria. About 1 million deaths due to malaria are in children under the age of 5 years (Opreh *et al.*, 2008). Development of new drugs and vaccines has

been the result of increased investment formation of public private partnerships.

The challenges to malaria control the world wide, is the development, spread and intensification of parasite resistance to antimalarial drugs including: impaired hearing, impaired immune response and neurological disorders. Certain signs and symptoms characterize malaria. These include: fever, chills, headache, spleen enlargement (splenomegaly), muscular pains and anaemia. Others include: cold, mouth sore, jaundice, liver enlargement (hepatomegaly) and swelling of subcutaneous tissues mainly in children (Zoungrana *et al.*, 2014).

Malaria disease must be understood as on component of a complex and changing global ecology which is shaped by economic, social, environmental, demographic and technological changes including microbial adaptation. The size, nature and complexity of most community settings make it difficult to keep up adequate surveillance of most environmentally related diseases. Environmental changes create room for disease vectors/reservoirs and ecological niches for animals which harbour disease agents. This may result from deforestation, road construction and poor sewage disposal. In other words, man and animals in their daily activities generate wastes and other contaminants that provide fertile environment for transmission of disease pathogens (Njunda *et al.*, 2013).

In areas of intense transmission, children acquire immunity that protects them from severe malaria attacks and death. The bulk of malaria morbidity and mortality is concentrated in preschool aged children. In particular, there is paucity of data in childhood malaria in Mbaise, Imo state. This has made it difficult for a proper appreciation of the epidemiology of the disease for a proper appreciation of the epidemiology of the disease to justify interventions. The present study was designed to fill in the gap in our understanding of childhood malaria in Mbaise, Imo state, Nigeria.

## **MATERIALS AND METHODS**

The equipment used in this work included needles, slides, burnsenburner, weighing balance, microscope, thermometer other materials included blood samples, oil immersion and leishman solution.

## **STUDY AREA:**

The study was carried out in the three local government areas of Mbaise in Imo State namely: Aboh mbaise, Ahiazu Mbaise and Ezinihitte Mbaise. Mbaise is a thickly populated area with about 10 percent of the population of Imo State. It is bordered in the north by Ehime Mbano, in the south by Ngor Okpala, in the east by Obowo and in the west by Ikeduru, the majority of the population is broadly dispersed in a vast number of rural settlements.

Just like in Imo state, there are two seasons in a year namely: rainy season and dry season. Rainy season starts from April and ends in October while dry season starts from October and ends in March with an average temperature of about 25<sup>o</sup>c – 32<sup>o</sup>c. the mean annual rainfall is between 1800 mm and 2500 mm per year with relative humidity of about 78% occurring during the wet season. The vegetation is tropical rainforest with palmtrees and plantain as the major forest resource. Predominantly, the people are of Igbo ethnic groups, 95% are Christians. The inhabitants are mostly civil servant, traders and farmers. Seven medical centres which are located at strategic points and serve as the population referral centres were used in the study. These hospitals were selected based on proximity and availability of laboratory equipment needed for this study.

## **SAMPLE POPULATION**

### **CRITERIA FOR SELECTION OF PATIENTS**

Data were collected from the patients who reported in the hospitals and those who came for immunization at health centres. For these children. Their ages were recorded. Those who fell within the ages 0-5 years were considered and their weights recorded. Their parents were interviewed for signs and symptoms of malaria. Two groups were gotten, those with clinical symptoms and those without clinical symptoms. The two groups were examined for malaria parasites. Those who tested positive were selected and treated. They were advised to come back after 2 weeks. Those whose symptoms persisted to come back after 2 weeks. Those whose symptoms persisted were given a second dose of the drug. After one month they were all examined for the parasite. This monthly examination, continued over a period of 11 months (January to November, 2020).

1,500 patients who exhibited certain symptoms of malaria in the area are brought to the seven medical centres chosen for this study. The symptoms

included fever, chill, headache, flu etc, the incidence of malaria was carried out amongst the children aged 0-5 years and was monitored over an 11 months period January-December, 2020

### **CRITERIA FOR SELECTING HOSPITALS**

Selection of hospitals used in this study was based on

Location; the proximity of the hospital is of great importance because the people consider the nearness of the hospital to their homes and consider it before accepting candidature of the study.

Equipment used in study are indispensable. So certain hospitals that serve as referral centres and have good laboratory equipment were chosen to ease the problem of the equipment.

Based on this, the patients were selected from Aguneze, Amuzi, Nnarambia, Ogbe and our communities in Ahiazu Mbaise were selected. Oke-Uvuru, Logi and Nguru communities were selected Aboh Mbaise while Ihitte, Amumara and Okpofe communities were selected from Ezinihitte Mbaise and Mejex clinic, three clown hospital and maternity, Monica memorial hospital, Cecilia memorial hospital and maternity were chosen as reference centres.

### **SOCIO ECONOMIC STUDIES**

The methods used in data collection for socio economic studies were interviews and participant observation techniques. Series of meetings were held with parents and teachers association (PTA) of some nursery and primary schools in the area, and during their immunization days at the health centres. I also met with the director of the medical centres used in this study.

Interviews were conducted amongst 30 individuals which included mothers, fathers and others who have some reason to come around. This practice was carried out to identify the people's beliefs, and knowledge about malaria in that area. The results of these meetings and interviews assisted me in choosing my cases.

### **MALARIA PARASITE EXAMINATION**

For each respondent, a finger prick of the thumb was done with a sterile needle after sterilizing the slides in hot air oven, a drop of blood was dropped

on the slide and used to make a thin smear. The set up is passed over a Bunsen burner to heat fix, then the Leishman solution was poured in it to make it clearer, then blow dried, viewed under times 100 microscope and for morphological confirmation, was later viewed in an oil immersion microscope. Results were taken down. After treatment, the respondents were tested again, then periodically within the study period

### **INTERPRETATION OF RESULTS**

While viewing under the microscope, one will notice that the cells assumed the colour of the Leishman solution. The cells with rings are counted and compared of 200 leukocytes. +(1-10 parasite/100 high power field). ++(11-1000 parasites/1000 high power field), and +++(1-10 parasite in every high power field). The pluses increase according to the intensity of the disease

### **DATA ANALYSIS**

Analysis of the data was done through the deductions of daily, monthly and yearly distribution of malaria amongst children aged 0-5 years in the area, from January to November, 2020 analysis were done using statistical analytical system. The correlation analysis were used to examine the degree of relationship between variables.

### **RESULTS**

Out of the 1500 persons examined parasitology, 1065 (71%) were positive while 435 (29%) were negative. 500 samples were collected from each local government, 280 (56%) were positive in Aboh Mbaise, 365 (73%) were positive in Ahiazu Mbaise while 420 (94%) were positive in Ezinihitte Mbaise (Table.3.1). About 75% of children in this area experienced malaria attack about 3-4 times a year.

Table 3.2 shows the age prevalence of malaria in the three local government areas in Mbaise. Infection decreased as the age increases, with the highest infection occurring between 1-2 years with the rates of 27.2%, 40.1%, 15.8%, 9.4% and 7.4% for 0-1 years, 1-2 years, 2-3 years, 3-4 years and 4-5 years respectively.

The building types were also related to the prevalence of malaria in the area as shown in table 3.5. The highest groups of malaria were seen amongst those living in thatched roof (55.4%) followed by that of mud walls (27%) and block and zinc (17%)

Table 3.4 illustrates the monthly distribution of malaria in children in Mbaise. June has the highest occurrence with 491 cases while December has the lowest occurrence with 71 cases.

Table 3.2 shows the distribution of malaria parasitaemia among symptomatic and asymptomatic children. Those from Cecilia Memorial Hospital have the highest (650) (84.4%) while Ahiazu Health Centre has the lowest (1410) (92.8%).

The seasonal distribution of childhood malaria in the study area is depicted in Table 3.6 according to the data obtained from the clinics. The highest prevalence was recorded during the rainy season of 2009. The month of June had (491) cases, October had the least prevalence with 134 cases.

The dosage of Coartem as used for the treatment of cases is shown in Table 3.7 for children 0 months-5 months, weighing 0-4 kg, ½ tablets were given twice for 3 days, those of 6 months – 3 years weighing 5 – 14 kg, 1 tablet was given twice for 3 days and for those of 4 years – 6 years 2 tablets were given for 3 days.

**TABLE 3.1: PREVALENCE OF MALARIA IN THE THREE LOCAL GOVERNMENT AREAS**

LGA	Total Examined	Positive cases no(%)	Negative cases no (%)
Aboh	500	280(56%)	220(44%)
Ahiazu	500	365(73%)	135(37%)
Ezunihitte	500	420(84%)	80(16%)
<b>Total</b>	<b>1500</b>	<b>1065(71%)</b>	<b>30(29%)</b>

**TABLE 3.2 THE DISTRIBUTION OF MALARIA AMONGST CHILDREN THAT HAVE SYMPTOMS AND THOSE THAT DON'T HAVE SYMPTOMS IN STUDY POPULATION**

S/N	MEDICAL CENTRES	THOSE WITHOUT SYMPTOMS NO(%)	THOSE WITH SYMPTOMS NO(%)
1.	Mejex clinic	312(3.82)	504(61.8)
2.	Cecilia memorial	120(15.6)	650(84.4)
3.	Three crown hospital	82(12.0)	600(88.0)
4.	Monica memorial	108(22.1)	380(77.9)
5.	Aboh health centre	30(14.7)	173(85.3)
6.	Ahiazu health centre	11(7.20)	141(92.8)
7.	Ezunihitte health centre	30(12.6)	209(87.4)
	<b>TOTAL</b>	<b>693</b>	<b>2657</b>

**TABLE 3.3 AGE RELATED PREVALENCE OF MALARIA IN MBAISE**

STUDY AREA	TOTAL EXAMINED	NO POSITIVE (%)					
		0-1	1-2	2-3	3-4	4-5	AGES
Aboh	500	280(56%)	80(28.7)	105(37.5)	42(15)	27(9.6)	25(8.9)
Ahiazu	500	365(73)	110(30.1)	145(39.1)	60(16.4)	30(8.2)	20(5.5)
Ezunihitte	500	420(94)	100(23.8)	177(42.2)	66(15.7)	43(10.2)	349(8.1)
<b>TOTAL</b>	<b>1500</b>	<b>1065(71)</b>	<b>290(27.2)</b>	<b>427(40.1)</b>	<b>168(15.8)</b>	<b>100(9.4)</b>	<b>79(7.4)</b>

**Table 3.4 MONTHLY DISTRIBUTION OF CHILDHOOD MALARIA IN THE STUDY POPULATION**

Medical Centres	J	F	M	A	M	J	J	A	S	O	N	
Mejex clinic	55	50	61	100	110	120	100	143	101	42	34	
Cecilia	31	63	51	80	122	101	101	102	72	14	33	
Mem. Hospital												
Three crown hosp	34	51	31	107	105	100	100	95	3	25	31	
Monica mem. hosp	52	46	43	41	30	90	80	40	21	16	29	
Aboh H.C	13	16	17	26	20	21	32	29	15	9	5	
Ahiazu H.C	4	6	20	17	9	27	21	20	16	7	5	
Ezunihitte H.C	18	24	13	14	35	32	30	13	24	21	15	
<b>Total</b>	<b>207</b>	<b>256</b>	<b>236</b>	<b>236</b>	<b>385</b>	<b>431</b>	<b>491</b>	<b>464</b>	<b>452</b>	<b>287</b>	<b>134</b>	<b>152</b>

**KEY**

J – JANUARY  
 F – FEBRUARY  
 M – MARCH  
 A – APRIL  
 M – MAY  
 J, - JUNE  
 J – JULY  
 A - AUGUST  
 S – SEPTEMBER  
 O – OCTOBER  
 N – NOVEMBER  
 D – DECEMBER

**Table: 3.5 THE EFFECT OF BUILDING PATTERN ON INCIDENCE OF MALARIA DISEASE IN MBAISE**

Study Area	Total Examined	No positive(%)	thatched roof No(%)	Mud walls No(%)	zinc & block No.(%)
Aboh	500	280(56)	165(58.9)	66(23.6)	49(17.5)
Ahiazu	500	365(73)	205(56.2)	98(26.8)	62(17)
Ezinihitte	500	420(94)	220(52)	130(31)	70(16.7)
<b>Total</b>	<b>1500</b>	<b>1065</b>	<b>590(55.4)</b>	<b>294(27.6)</b>	<b>181(12)</b>

**Table 3.6; SEASONAL PREVALANCE OF CHILDHOOD MALARIA IN MBAISE (OCTOBER 2008 TO OCTOBER 2009**

Medical Centres	DRY SEASON			RAINY SEASON	
	October (2008)NO(%)	January (2009)NO(%)	April (2009)NO%	June (2009)NO(%)	Total
Mejex clinic	42(13.3)	55(17.4)	100(31.5)	120(37.9)	317
Cecilia memorial	14(6.2)	31(31.7)	80(35.4)	101(44.7)	226
Hospital and maternity					
Three crown hospital	25(9.4)	34(12.9)	107(40.2)	100(37.60)	266
Monica memorial	16(8.0)	52(26.1)	41(20.6)	90(45.2)	199
Aboh health centre	9(13.5)	13(18.4)	26(37.7)	21(30.4)	69
Ahiazu health centre	7(12.7)	4(7.3)	17(30.9)	27(49.1)	55
Ezinihitte health	21(24.7)	18(21.2)	14(16.2)	32(37.7)	85



**Table 3.8: EFFECT OF TREATMENT OF MALARIA WITH CHOLOROQUINE**

Medical Centre	No of positive Cases	no treated with chloroquine	positive response	number persisted
Mejex clinic	317	317	10	307
Cecilia memorial	226	226	8	218
Three crown Hospital	119	119	-	119
Monica Memorial	199	199	2	188
Aboh health Centre	69	69	-	69
Ahiazu health Centre	55	55	-	55
Ezinhitte health Centre	85	85	2	83
<b>Total</b>	<b>1070</b>	<b>1070</b>	<b>22</b>	<b>1039</b>

**Table 3.8: EFFECT OF MALARIA TREATMENT WITH COARTEM**

Medical centre persisted	No of positive Cases	No treated with coartem	Positive response	Number
Mejex clinic	317	307	302	5
Cecilia memorial Hospital	226	218	215	1
Three crown Hospital and maternity	119	119	119	-
Monica Memorial Hospital	199	190	188	2
Aboh health Centre	69	69	69	-
Ahiazu health Centre	55	55	55	-
Ezinhitte health Centre	85	85	85	-
<b>Total</b>	<b>1070</b>	<b>1043</b>	<b>1033</b>	<b>8</b>

## **DISCUSSION**

The result of this study has proved that malaria is endemic in Mbaise. The local government areas. Ezinhitte has the highest prevalence with 94 % of the 500 samples being positive with Aboh has the lowest having 56% of the sample population positive. This variations could be due to unequal exposure of the population to mosquito vectors that carry the plasmodium. It could be attributed to the difference in the daily activities of man and animals in these areas (Zeidan *et al* (2005).

Greater percentage of people in Ezinhitte are farmers who carry out certain actions that bring them closer to the vector. Some villages resides around the Imo river and the presence of this river creates niches that harbour vectors (Njunda *et al.*, 2016).

Malaria prevalence is low in infants less than 1 year as deduced from this study. This agrees with work of Dongho *et al*, (2011) which observed that infants under 3 months have very low prevalence of malaria and this could be attributed to the immunity gotten from their mothers after birth which gradually disappears as the child advances in age. As they grow, the persistent attack of malaria, make them develop immunity against infection. This could be the reasons why prevalence reduced in older children (Issifou *et al.*, 2007).

The month of June and July were the peak period of prevalence of malaria according to seasonal distribution of malaria. This corresponds to the work of Dzeing-Ella *et al*(2005) who deduced that weather variations affect vector reproduction, parasite transformation and transmission. It agrees with Forlack *et al*, (2005)who observed that as the temperature decreases the number of days to complete an extrinsic cycle increases for a given plasmodium specie. In areas of poor sewage disposal, malaria ravages the populace, this tallies with the investigations of WHO/UNICEF in the roll back malarial programme.

Plasmodium falciparum accounted for over 90 percent of the cases gotten from different locations in the area. This result tallies with the work of Gay-Andrieu *et al* (2005) who attributed this high percentage to the susceptibility of the peoples skin to the organisms saying “in Nigeria, their duffyerythrocytic membrane, have immunity against *P. vivax* .this accounted to the absence of this specie in the country” (Kwenti *et al.*, 2016).

This result of this study, it was observed that people who lived in mud houses and thatched roofings were mostly affected with water collectibles, stagnant waters and indiscriminate disposal of waste, refuse dumps and so on are instruments of disease dispersal in this area these practices take the order of the day resulting to a huge turnout of malaria victims. No wonder the roll back malaria complained that poor environmental conditions are hitch backs to roll back malaria to stagnantwaters.

Result also shows the relationship of building pattern with the distribution of malaria. The mosquitoes that are vectors of malaria parasites- plasmodium are nocturnal insects (Marsh (2008). During intense heat or heavy rainfall, these mosquitoes enjoy habitation in these thatched roofing and cracked walls especially mud walls which provide conducive environment for them to live and reproduce. At night, they easily find their ways to humans who already co exist with them. So, one can easily deduce the reason why people that lived in mud houses and thatched roofing suffer from malaria more than those who live in zinc and blocked walled houses which atleast reduce the vector – to the man contact due to the lack of cracks and the grasses to accommodate the mosquitoes (Camara *et al.*, 2011).

It was also observed that children live with the malaria parasite without symptoms and after a period of incubation the symptoms manifest. 100% of these children with symptoms showed positive result while about 20 % of those without symptoms turned out to be positive thus proves the fact that the lifecycle of the malaria parasite occurs both in humans and mosquitoes, hence the period during which hatching process is going on does not allow the manifestation of the symptoms until the parasite is fully grown. The three local governments of Mbaise, Aboh, and Ezinhitte irrespective of the uniformity in the topography, culture and tradition, experience malaria in different intensities.

The study revealed arthemisinin based combination therapy (ACT) as the most effective anti malarial drug against plasmodium specie especially *plasmodium falciparum*. The drugs are twice as potent as quinine and other single anti malarial therapies, from this study, sex makes no difference, that is, it is not a factor in the distribution of malaria, hence malaria is an everyday occurrence in the area. On the average, each child absent from school 2-4 times a month due to malaria attack. Parents loose their jobs while finding solutions to the conditions of their ill children (Antonio-Nkondjio *et al.*, 2013).

## **CONCLUSION**

From the results gotten from this analysis, it is not an overstatement to say that childhood malaria can exert a long lasting trauma in an individual and the populace in this area, more so, poor environmental conditions enhance the spread of malaria endemic areas. The study also reconfirmed arthemism in based combination therapy (ACT) as the most effective drug for malaria treatment in recent times.

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