

Emerging Trends in Clinical Malaria in Parts of Abia State: Influence of Environmental, Human and Socio-Cultural Factors

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Abstract: A study was conducted between 1999 and 2003 on the sustenance of malaria in parts of Abia State, based on data from randomly selected clinics, hospitals and health-care centers in the state. A total 66,053 patients were recorded. Of this number, 50,998 studies of malaria were reported in the study period comprising of 5,218: 6,010:10,850: 13,915 and 15,005 for 1999, 2000, 2001, 2002 and 2003, respectively. There were significant increases in malaria records for the period 1999 through 2000 to 2003 at $p > 0.05$. The sustenance of malaria was related to the biology of the disease and some emerging trends in clinical malaria as boasted by poor environmental, human and social factors. Other factors responsible for the increase in the incidence of clinical malaria were found to include drug and insecticide resistance, global climate change, land use practices, the human ecology, poor diagnosis of the disease and management modalities plus the factor of sundry socio-cultural beliefs.

Key words: Emerging trends, clinical malaria, environmental, human and socio-cultural factors

INTRODUCTION

Malaria has been and is still a leading cause of human morbidity and mortality globally. In Africa, clinical malaria is still a major health problem mostly among pregnant women and immuno-compromised individuals^[1-3]. This situation is particularly so because of its clinical, environmental, economic and socio-cultural consequences of the disease^[4,5]. Available records show that about 2 billion people (40% of the global population) live in areas of the world where malaria is endemic. Malaria was mainly a rural disease but the development of urban slums combined with poor environmental sanitation, poverty, decay of public health infrastructures and other factors such as drug and insecticide resistance, plus human migration have tended to popularise malaria in both urban and rural settings.

Malaria can therefore be regarded as both an urban and rural disease. Furthermore it has been estimated that 300 to 500 million studies of clinical malaria occur per annum, with 1.5 to 2.2 million deaths^[6,7]. There is no documented rate of the death toll due to malaria in Nigeria as well as Abia State during the time of this study. But clinical evidence maintains that death due to malaria is

enormous (up to 60% of under 5 deaths). Clinically, patients have fever, chills, sweating, headache, weakness and symptoms mimicking “viral syndromes”. Later, severe disease may develop within an abnormal level of consciousness: Severe anaemia, renal failure and multi-system failure. In short, malaria has protean clinical manifestation, although no sign or symptom is pathognomonic of malaria^[8,9].

Evidence abound that malaria has existed for as long as human beings have. However, it is currently considered as an “emerging disease” due to the increase in the incidence of studies in the past three decades-globally^[10]. The World Health Organisation declared malaria control a global priority, due to the worsening situation in the epidemiology of clinical malaria. In 1993, World Health Assembly urged member States and WHO to increase control efforts through an integrated approach. The problem of malaria is even worse in Nigeria as well as Abia State in the face of environmental degradation and poor control strategy. The phenomenon of increased incidence of clinical malaria is a well-known issue. This may be due to favorable environment for the development of the mosquito vector such as temperature, rainfall, relative humidity, abundance

of aquatic vegetation and development of water bodies that is capable of supporting the life-stage forms of the insect vector etc^[11-15].

Other factors that may be responsible for the emergence of clinical malaria will include the lack of effective control malaria program in the state, decay in public health infrastructure, neglect of environmental sanitation for over 4 decades in Nigeria (between 1970 and 2000), plus poor socio-cultural and economic problems since the end of the Nigeria civil war.

With particular reference to Abia state and most parts of South Eastern Nigeria, factors to consider also include the Genetic make up and reproductive ability of *Plasmodium* species, the issue of mass migration of people e.g. rural-urban migration, bring in malaria into new areas as well as global travelers, visiting exotic areas and bringing new disease home with them. There is also the question of growth of congested urban slums, lacking sanitation and clean water, thereby resulting in large numbers of communicable disease being spread by food, water and environmental factors, all contributing to this phenomenon of emergent infections. Another reason for resurgence of clinical malaria may be the obvious population shifts associated with increasing urbanization that increase human contacts with remote environments and poorly understood ecosystem which hide the mosquito insect vectors.

Finally the poor economic status of most patients deny them the ability to afford proper treatment of studys, hence there is no money. This may lead to improper tratment of studys, which may become complicated and even fatal, apart from increasing the frequency of the disease^[16-21]. Studies on the cumulative records of laboratory-diagnosed child malaria in Aba metropolis Nigeria between 1991 to 2000,^[3] had reported 71% of clinical malaria out of 17.783 persons who presented at different medical laboratories in Aba. The incidence and intensity of clinical malaria in patients showed a significant and progressive increase over the study period. They attributed the increase in the incidence of human malaria to the development of urban squalor, increasing level of poverty and large-scale rural-urban migration plus various unhygienic tendencies by urban inhabitants. Other important factors highlighted were gross environmental decay, inadequate and deteriorating healthcare system and increasing insecticide and drug resistance in the face of many limited control measures.

Aims of this study were as follows:

- To evaluate the prevalence of clinical malaria from 1999 to 2003.

- To evaluate the role of poor environment sanitation and human and socio-cultural factors in the progressive increase in clinical malaria in Abia State.
- Make recommendations for possible control measures for the disease.

MATERIALS AND METHODS

Abia State is one of the 36 States of the Federal Republic of Nigeria. Abia State was created from the fomer Imo State and Anambra State in 1991 by late General Sani Abacha. It is located in the Eastern part of the country. Abia State is inhabited by Ibos (Igbo tribe). According to the 1991 National Census it has a population of 2,297.978, although in reality the population of Abia State seem quit above the 1991 statistics. For research purposes Abia State has projected population of 3.5 million. It is bounded in the West by Imo State, in the North/North East by Anambra, Enugu and Ebonyi States. Abia is bounded in the East/South East zone by cross-river and Akwa Ibom States in the South by Rivers State.

It has two geological regions, namely, a coastal plain and a plateau portion. The vegetation is typically rainforest, although some parts consist of Guinea savanna due to poor environmental management and pollution. It has a mean annual rainfall of about 2.250 to 2.500 mm. The mean temperature is 25 to 27°C. The relative humidity is 80%.

Abia people are mainly farmers, apart from the urban dwellers of Aba and Umuahia. Umuahia the capital city is inhabited mainly by civil, servants few artisans and some Agricultural aborigines. Aba, which is the major urban center, is known for its commercial activities. Abia State, like many other States of Nigeria, is faced with perennial ecological problems, favorable for the survival of the life cycle stages of parasitic infections, malaria inclusive. Malaria occurs through-out the year with two seasonal peaks featuring, at the beginning of the rainy season, (i.e., April to July) and during the beginning of the dry season (i.e., November to February).

The major health facilities in the State include the Abia State University Teaching Hospital, Abe and the Federal Medical Center Umuahia. The cottage and General Hospitals available are grossly ill equipped and poorly staffed and financed. Above all, some of them are located far away from the people, usually leading to poor patronage. This had given way to the proliferation of private clinics and hospitals; most of them poorly equipped and badly managed. The worst of all is the pervading presence and activities of patent medicine dealers and herbalists, plus other quacks, all claming supremacy in the ability to effect cure of various diseases.

EXAMINATION OF PATIENTS

- Clinical examination: Subjects with clinical signs and symptoms such as fever (40-41.5°C) headache, joint pains catarrh etc were suspected as having clinical malaria.
- Patients with clinical signs and symptoms were sent to specific serial parasitological examination of patient blood for the presence of malaria parasite. All subjects who were not living in Abia State were excluded from the study. All malaria studys were confirmed by microscopical examination of Giemsa-stained thin and thick films in respective reference laboratories.

Parasitological reports were subsequently sent to a physician for further management of the confirmed referred studys.

RESULTS

Between 1999 and 2003 clinical and parasitgological examination were made of 66,053 subjects from randomly selected reference hospitals, clinics and laboratories in some parts of Abia State, Nigeria

The confirmatory parasitological reports of all the suspected patients with clinical malaria showed that 50,998 (74%) out of the 66,053 blood samples had malaria. comprising of 5,218 (10.3%) 6,010 (11.8%), 10,915 (21.3%), 13,115 (27.3%) and 15,005 (29.4%) for the years 1999, 2000, 2001, 2002 and 2003, respectively.

There were significant increases in malaria records for the period, 1999 through 2001 to 2003 at p>0.05. The highest records of clinical malaria featured in the year 2003 with 15,005 (83%0 positive studys out of 18.115 patients examined that year: while the lowest scores were recorded in 1999,with 5.218 (61 %) out of 8.500 subjects examined. malaria incidence increased rapidly from 1999 to 2003 in the studied population (Table 1).

Clinical malaria in the group studied showed that 22,649 (44%) out of 31,240 males and 28,349 (56%) out of 35,613 females had malaria. Given a male-female ratio of one.

DISCUSSION

Malaria is unique among febrile illnesses, because its roots lie deep within human communities. Earlier studies^[5] had shown that enormous genetic diversity and complexity may manifest through variations in allelic frequencies as well as in actual genotypic variation in parasite population: and these may influence the distribution and epidemiology of malaria in the world, mostly with *Plasmodium falciparum*. The force of transmission of malaria infection requires interaction of four epidemiologic factors, such as:

- The human host
- The malaria parasite
- The insect vector
- The physical, biological and socio-economic environment.

The level of transmission (force of infection) is determined by the prevalence of infection in man, characteristics of the local mosquito vector population (*Anopheles gambiae* complex) including their density, feeding, resting behavior, susceptibility to infection and their effectiveness as vectors. Other factors include the presence of susceptible human population and favorable local climatic conditions that affect vector breeding^[7].

Malaria remains major threat to public health. More than 40% of the global populations are exposed to risk of human malaria. Results from the study show that in 1999, the prevalence of clinical malaria in Abia State was 61.4% while in the year 2003 the frequency was 83.0%. This shows a remarkable increase in the spread and sustenance

Table 1: Distribution of clinical malaria in Abia State according top year and sex based on clinical and parasitological examination of blood films from patients

Year	Total examined 1	Total positive 2	Female examined 3	Female positive 4	Males examined 5	Male positive 6	Total percentage positive (199-2003)
1999	8.500	5.218 (61.4)	4.150	3.150 (60)	4.068	2.068 (40)	10.29%
2000	7.375	6.010 (81.5)	3.673	2.989 (49.3)	3.704	3.021 (50.3)	11.8%
2001	15.013	10.850 (72.3)	8.5700	6.700 (61.8)	6.313	4.150 (38.2)	21.3%
2002	17.050	13.915 (82.6)	8.510	7.010 (50.4)	8.540	6.905 (49.6)	27.3%
2003	18.115	15.005 (83.0)	10.580	8.500 (56.6)	8.615	6.505 (43.4)	29.4%
Total	66.053	50.998	35.483	28.349	31.240	22.649	100%

of clinical malaria in the population studied. There was a significant difference in the spread of malaria over the five-year period at 5% confidence interval ($p > 0.05$).

The above report shows a strong correlation from the study of^[3], on the cumulative records of laboratory-diagnosed child malaria in Aba Abia State, Nigeria between 1991 and 2000. The earlier report showed that in 1999, the prevalence of child malaria was 61.1% while in 2000 it was 76.6%. There was a significant difference in malaria prevalence over the ten-year period at 5% interval (at $p > 0.459$). A comparison of the present report and the previous records by Amadi *et al.* (2001) ultimately indicate that there is a constant increase in clinical malaria at all levels, taking cognizance of malaria prevalence from 1991 to 2003.

The question then is why is clinical malaria on the increase despite all the efforts by private and international organization and various governments in the combat of this protozoan parasites disease. In an attempt to answer the question, we have to look at the influence of the environment (physical, biological, socio-economic), human and socio-cultural factors on the phenomenon of malaria emergence in parts of Abia State and Nigeria generally. Malaria is transmitted only female *Anopheles* mosquito because of their blood-feeding habits. The life expectancy of the mosquito depends on prevailing environmental conditions. Relative humidity especially determines mosquito life expectancy, longevity and therefore determines also whether sporogony will be complete and possible increase in malaria transmission.

All these affect the level of resurgence of clinical malaria. Furthermore seasonal variation in relative humidity that shortens the life expectancy of a very potent vector species may cause malaria transmission to stop, though the temperature may be favorable for sporogony. Therefore malaria transmission is largely mosquito density dependent according to UNDP/World Bank/WHO^[10] the breeding sites of mosquitoes vary for different species: And the variations which may occur with respect to water flow can affect the multiplication of the vector. Sun intensity, water temperature and aquatic vegetation in the breeding site variously affect survival of the insect vector. For example, environmental temperature regulates the spread of mosquito breeding: the lower the temperature the longer it takes to develop.

Mosquito mortality is higher when humidity and temperature are low. Furthermore, rainfall can influence malaria transmission in various ways. It is well known that surface water collection can create breeding spaces for some, not all *Anopheles* mosquitoes. Evaporation of surface water can keep humidity high and, thus prolong

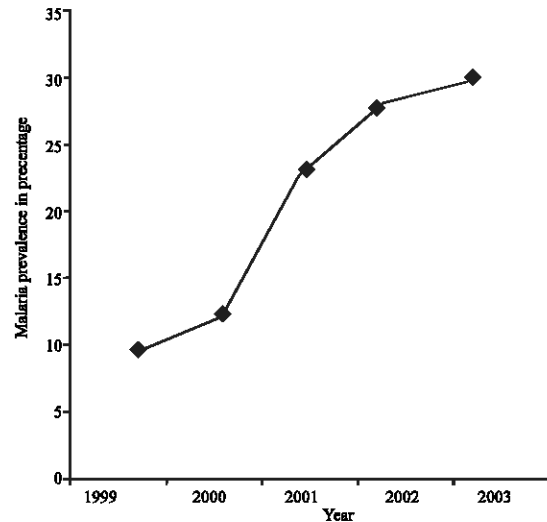


Fig. 1: Line graph showing the distribution of clinical malaria in Abia State according to year based on clinical and para

the life span of the mosquito. On the contrary, heavy rainfall may flush the breeding place of mosquitoes and terminate larva survival. The rapid increase in clinical malaria in the population studied (Abia State) may be associated strongly with the favorable humidity of up to 80%, rainfall, temperature and other environmental factors as seen in Abia State. Another useful index for the resurgence of malaria may be the scenario of growth of congested urban slums, devoid of good sanitation and clean water. Again, the gross mass migration of rural dwellers in to the urban areas of Aba and Umuahia, may not be dissociated with the sustenance and rapidly increasing clinical malaria.

Other factors responsible for the increase in the number of clinical malaria as shown in Fig. 1, may be attributed to the lack of organized mosquito control program in the state, alongside with the problems associated with the knowledge, attitude and practice of the use of mosquito treated bed nets. For instance, at least 65% of the population in Abia State, are not aware of the treated bed nets, which is an important strategy in the control of malaria under the roll Back malaria. Again, the costs of these bed nets are usually beyond the level of the average citizen: costing at ₦ 950 to ₦ 1, 200 each.

Finally, other factors include inadequate and deteriorating health systems, use of fakes anti-malaria drugs due to adulteration: and growing instances of insecticide and drug resistance. For effective malaria control to be achieved, it is advisable to use an integrated approach involving chemical control, ecological control

and medical control/land use practices. Lastly government and other stakeholders in Malariology should encourage special malaria clinics headed by experts.

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