

The burden of malaria among under five children: Finding from Makurdi city, north central Nigeria

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Abstract

Background

As Africa marks the ninth year of roll back malaria programme, several of her endemic communities still appear heavily tied down by the disease. This study was therefore carried out to ascertain the burden of *Falciparum parasitaemia* among children in Makurdi city.

Methods

The study was hospital based; children attending different Primary Healthcare Centres (PHCs) for their routine immunization were recruited for the study. Information about the children such as: age, sex, and utilization of insecticide treated bed nets (ITNs) were obtained using structured questionnaire. Body temperatures were measured using paediatric thermometers. Thick and thin arterial blood films were stained using Giemsa's stain and examined microscopically for malaria parasites. Packed cell volume (PCV) was measured using microhaematocrit tubes with haematocrit machine.

Results

The incidence of *Plasmodium falciparum* parasitaemia was 32.3% (162/502); those aged 0-12 months, (8.7%,4/46) and those aged 49-60 months, (50.0%, 30/60) had the lowest and the highest rate of infections respectively. Ownership and utilization of insecticide treated bed nets (ITNs) was recorded among 25.0% (128/502) of the children; 28.0% (140/502) used untreated bed nets, while 47.0% (234/502) had no access to any bed net. Fever was recorded among 1.8% (9/502) of the children of which 88.9% of them had malaria parasites in their blood (P<0.05). Anaemia was recorded in 85.9% (139/162) and 15.0% (45/302) of those with malaria parasites in their blood and those without respectively, (P<0.001).

Conclusion

Malaria is still a major problem in Makurdi city, more efforts should be directed, among others, towards the provision of Insecticide Treated bed Nets so as to hasten the actualization of the goal of "Roll Back Malaria" initiative.

Keywords: Malaria parasites, Insecticide Treated bed Nets, Children.

Introduction

Malaria is a common disease that affects about 500 million people across the globe every year with at least One million deaths^{1,2}. The disease still poses a serious threat to at least 2.75 billion (35%) of the world's population with the tropical and sub-tropical regions of the world bearing the major impact of the disease^{3,4}. The disease still constitutes a very serious health challenge on the African continent through its fatalities causing at least two million deaths annually, mostly among pregnant women and children; and with economic losses of over USD12 billion from the continent, the control

measures put in place by various stake holders notwithstanding^{5,6}. The present global malaria burden varies among countries and regions^{7,8}. Findings from Mozambique on 8,816 subjects showed an overall *Plasmodium falciparum* prevalence of 53.4% with a malaria prevalence of 9.4% which was commoner among children⁹. Findings from Niamey, Niger showed that malaria was confirmed by microscopy in 52% of the children randomly selected¹⁰; also in Malawi, malaria was said to cause clinical symptoms in at least 8 million of her entire 13 million populace¹¹; and in Rwanda,

Table 1. Methods* of malaria prevention among residents of Makurdi city (N=502).

| Protection Methods | Number (%) |
|-----------------------------------|------------|
| Insecticide Treated bed net (ITN) | 128 (25.5) |
| Untreated bed net (UTN) | 140 (27.9) |
| Otapiapia ¹ | 53 (10.6) |
| Spray Insecticide | 98 (19.5) |
| Mosquito coil | 45 (9.0) |
| Local methods | 38 (7.5) |
| Total | 502 (100) |

Key: *= Respondents were allowed to list only the commonest preventive method they use. 1= A local chemical usually sprinkled

79.3% of total admissions in a paediatric ward were attributable to malaria¹², while in Ibadan, Nigeria, 78% of children who presented with fever at the out patient clinic were said to have malaria¹³. In a study from Papua Indonesia on 373,450 patients, malaria was found to be present in 16% of them; those with malaria, 64% had *P. falciparum*, 24% *P. vivax*, and 10.5% mixed infections¹⁴. In a similar study in London, United Kingdom: most of the malaria cases were found to be imported from Africa¹⁰⁻¹³, Asia and Oceania as virtually all the 2867 studied had a positive history of recent travel to these regions¹⁵. Similar findings on importation of malaria into USA and Canada have been documented^{16,17}. In 1998 the WHO led other international organizations to come up with the "Roll Back Malaria" movement with the call on member nations on earth to eradicate malaria or at least drastically reduce its impact¹⁸. This was further domesticated on the African soil by the Abuja declaration, a meeting attended by 53 heads of state and government in Abuja, Nigeria's capital. The meeting among others was meant to intensify efforts on prevention and control of malaria in the context of African economic recovery and development towards her attainment of the millennium development goals (MDGs)¹⁹⁻²². The meeting also came to end with the resolution to half malaria illnesses and deaths by 2010, and further by 2015 on the continent. This led to the declaration of the year 2001 -2010 as malaria decade on the continent²³⁻²⁵. With barely a year to the expiration of the year set by the continental body on the malaria scale, there is need to assess the impact of the efforts of various governments towards this noble cause. Under five children are the most most vulnerable groups at the mercy of malaria onslaught in Africa^{26,27}.

Materials and methods

Study Area

The study was carried out in Makurdi, capital city of Benue state located in north central Nigeria and lies within latitude 7°44'N and longitude 8°35'E. The city has a population of about 700,000 inhabitants and forms as a link to most parts of northern and southern Nigeria for travellers. The city experiences rainfall from April to October with an annual rainfall of 1500mm- 1800mm with mean night and day temperatures which fluctuates between 30°C and 40°C year round.

Study Design

The study was carried out between September and November 2008 on children 0-5 years old attending Primary Healthcare Clinics (PHCs) sited at Wadata, North bank, High level and Wurukum in four major locations of the city for

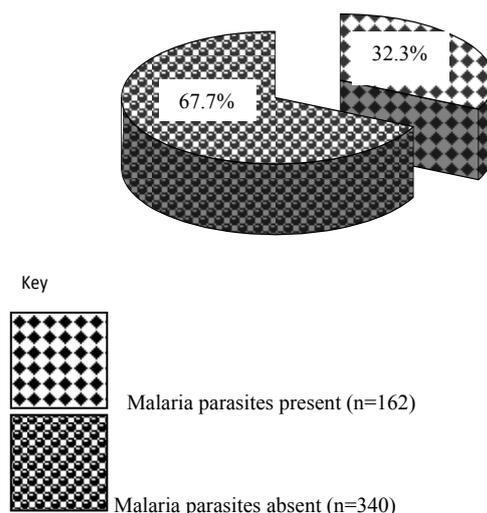


Fig 1. Incidence of malaria parasites in the blood samples of children in Makurdi city, north- central Nigeria (N=502).

their routine immunization exercises. Systematic random sampling method in which one after every child that fell within the age limit was recruited for the study, consent on behalf of the children were obtained from their mothers or accompanying relations. All children recruited (both healthy and sick) within the age interval (less than 5 years) were considered while those above 5 years were not. Structured questionnaires were earlier test-run, were either self or interviewer administered to the mothers or accompanying relations with valid information on the children. Information such as: age and sex of the child; marital status, methods of malaria prevention and mosquito control, and occupation of the parents were obtained. Children were weighed using Beam balance calibrated in Kilograms; body temperatures were taken by placing paediatric thermometers in the sublingual position for 60 seconds. Blood samples were collected from children who consecutively presented for their routine immunization exercise. Immunization exercises were usually three times in a week in each of the centres, Mondays, Wednesdays and Fridays; children were recruited once at which relevant information was obtained through questionnaires and biophysical measurements taken. Each of the three immunization days in one week were used to generate data from one PHC centre until the designated centres were completed. Arterial bloods were obtained from the thumb or toe with the aid of a sterile blood lancet. Thick and thin blood films were made and stained using Giemsa stain and examined for malaria parasites. The preparation was examined microscopically using X100 objective. Packed cell volume (PCV) for each subject was also measured using microhaematocrit capillary tube 2/3 filled with capillary blood and centrifuged in haematocrit machine for two minutes.

Analysis of Results

Data obtained was analysed using Epi Info 2002 statistical software, P values < 0.05 were considered significant.

Ethical Considerations

Ethical approval for the study was obtained from Ethical committee of the Benue state Ministry of Health.

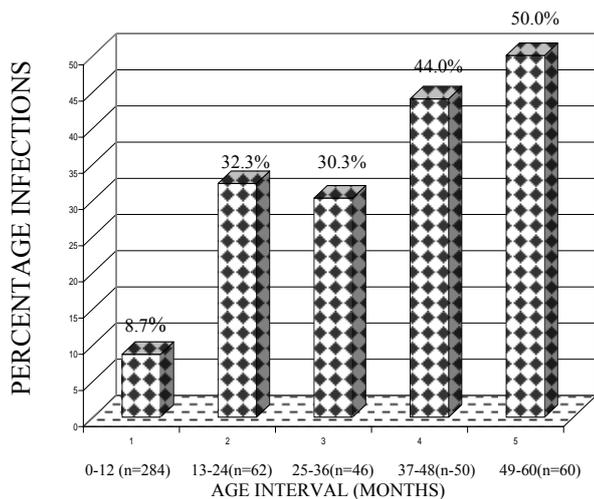


Fig 2. Age and presence of malaria parasites in blood samples of children in Makurdi city, north-central Nigeria. n=Total number of children in each age interval tested

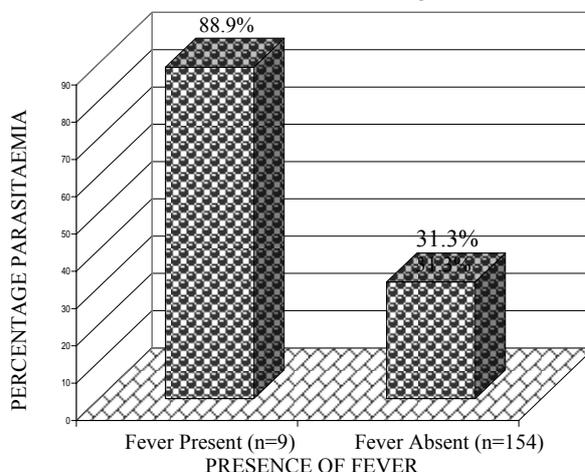
Results

Six Hundred and twelve questionnaires were administered while 502 (82.0%) were correctly filled and returned; only results from blood specimens and biophysical profiles of subjects with correctly filled questionnaires were analysed. Of the 502 children studied with age range from 2 weeks to 54 months; the mean age was 4 months (\pm 1SD) and modal age 4; 213(42.4%) were boys and 289(57.6%) girls. The incidence of *Plasmodium falciparum* in the blood samples of the subjects studied was 32.3% (162/502), all the malaria parasites identified were *P. falciparum*; 85.9% (139/162) of those with malaria parasites present in their blood were anaemic (PCV < 28.0%) compared to 15.0% (45/302) of those who had none, ($P < 0.001$), (Fig. 1). Based on age, 8.7% (247/284) of those aged 0-12 months were infected with malaria parasites; 32.3% (20/62) of 13-24 months; 30.3% (14/46) of 25-36; 44.0% (22/50) of 37-48; and 50.0% (30/60) of the 49-60 months old children respectively, ($P < 0.001$)(Fig. 2). Analysis of ownership and utilization of bed nets showed that: 25.0% (128/502) possessed and utilized Insecticide Treated bed Nets (ITNs) everyday; and 28.0% (140/502) utilized untreated bed nets; other malaria preventive methods among the respondents were: sprinkling of otapiapia 10.6% (53/502), spraying of insecticide 19.5% (98/502) and burning of mosquito coil 9.0% (45/502). (Table 1). Overall, 1.8% (9/502) of the subjects had fever (oral or axillary temperatures above 36.5°C) out of which 88.9% (8/9) had malaria parasites present in their blood ($P < 0.0005$)(Fig. 3).

Discussion

The incidence of *P. falciparum* parasitaemia among children in Makurdi city was 32.3% , the actual figure in the general population may be higher since the sample population consisted of apparently healthy children coming for their routine immunization. This figure is still high as it poses serious threat to the actualization, in the first instance, the cardinal goal of “Roll Back Malaria” initiative which is to at least half malaria burden on the continent by the year 2010¹⁹. There is need to direct the malaria control plan preferably to the vulnerable groups (pregnant women and children) and institute valid quality assurance to monitor progress, and shift from less relevant policy formulations. The findings from this study compares well with that of Tito *et al*, in Burkina Faso

where the incidence of malaria parasites was found to be 34.1%²⁴; Gerstl, *et al*, in Makamba province of Burundi where a higher figure of 47.2% from the 195 children studied had malaria parasites³⁰; Mboera, *et al*, in Tanzania who recorded a lower malaria prevalence of 21.0% from the 1643 children studied³¹; and Ofori, *et al*, in Ghana where *P. falciparum* parasitaemia among the 294 pregnant women studied was 19.7% with 35.9% placental infections³². Similar but varying figures have also been reported in Gabon³³, Mozambique¹⁶, and Kenya³⁴. African continent would need to adopt fresh strategies as well as increase their zeal by committing more resources, personnel and desired logistics needed to attain the set target for the control of this disease on the continent. The present findings are however different from that from Rwanda where over 79% of children admitted in a paediatric ward were said to be suffering from malaria¹²; and also that from Ibadan, Nigeria where also over 78% of paediatric outpatient attendees were said to have malaria¹³. The sampling methods in the two studies which involved children already with fever or malaria related illnesses could account for these high figures recorded and may not be exact reflection of the situation in the general population. The findings, nevertheless still attest to the fact that malaria is still a major health issue in several parts of Africa^{16,33,34}. The rate of ownership and utilization of insecticide treated bed nets (ITNs) was found to be 25.0% in our study; those who used untreated nets were 28.0% and those without nets were 47.0%. Although this finding is higher than that of the recently concluded nationwide survey on the use of ITNs where 11.5% usage was recorded³⁵; it is still low in view of the present global and continental renewed vigour to arrest the disease. It also appears the pattern of distribution of ITNs in various regions and states in Nigeria is not uniform; this needs to be closely assessed so as to ensure equitable distribution of ITNs for a more balanced and uniform country-wide supply and utilization. It also casts doubts on the possibility of halving the malaria burden in Makurdi city and several other African communities in about one year from now; since ITNs availability and utilization constitutes a very vital component of the present malaria control programme³⁶⁻³⁸. In view of the vital role ITNs play in the actualization of the RBM initiative, both governmental and non-governmental organizations should sustain their drive towards mobilization of adequate funds and requisite logistics towards its sustained and unhindered supply on the African continent. The breakthrough in malaria control recorded in Eritrea³⁹ and The Gambia⁴⁰ was, to a large extent attributed to



X^2 (Mantel-Haenszel)= 18.06, OR= 0.35, RR= 0.69, $P < 0.0005$

Fig 3. Rate of malaria parasitaemia among children with fever in Makurdi city

the successes achieved in the provision of ITNs to the countries' general populace. ITNs should be made available at no cost at virtually all government healthcare outlets from primary to tertiary so as to overcome the socio-economic barriers that could impede accessibility. In addition, there should be proper sensitization of the public on the importance of the commodity and probably relevant legislation put in place to regulate its retail in the open market so as to prevent sabotage. The fact that 88.9% of the children with fever had malaria parasites in their blood of which 85.9% of them were anaemic still confirms the already established fact that malaria is still the single most common cause of fever and anaemia among children in Nigeria and other parts of Sub-Saharan Africa⁴¹⁻⁴³. Clinicians would not have deviated so much on making a provisional diagnosis of malaria fever on first seeing a child with pyrexia after carrying out relevant clinical examinations⁴⁴. The present study was limited by the fact that being hospital based, it could not capture children as they appeared in the general population and therefore the findings may not be an exact reflection of what is in the general population. The present study has shown that malaria is still endemic in Makurdi city and the rate of utilization of insecticide treated bed nets still low with a high probability of not achieving the 2010 RBM mandate. The present effort by the government to control malaria in the country should be sustained and probably improved upon so that the country would not be left behind the present global wind to checkmate malaria. Insecticide treated bed nets should be made readily available to at least those most vulnerable to malaria. Also the country should avoid being eventually a net exporter of the parasite to other sister African countries and the rest of the world when others may have crossed over.

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