

**MALARIA IN ENDEMIC AREA OF OGUN STATE, NIGERIA:
INVESTIGATION OF PERCEPTIONS AND PRACTICES AMONG THE RESIDENTS
AND HEALTH PROVIDERS**

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ABSTRACT

Surveys were conducted on aspects of perceptions and practices among the residents and health providers on malaria in Abeokuta, the capital city of Ogun State located in the forest zone of Southwest Nigeria. Structured questionnaires were used to obtain information on the knowledge, attitudes, beliefs and practices of the residents, medical personnel and traditional healers with respect to malaria. Most households in the high density areas have a mean greater than 10 occupant per house, but below 10 occupants in the low density areas. Most of the residents (> 90%) were knowledgeable about mosquito breeding and the association between it and malaria. The use of door and window nettings against mosquitoes were common practices in the low density areas and almost absent in the high density, preferring mosquito coils and insecticides. Sixty percent of attendance at clinics and hospitals were due to malaria, with fever, headache, body pain and vomiting being the main symptoms. The first line drug is chloroquine but they reckon that at least 30% of cases present malaria resistant to chloroquine, to which alternative drugs such as fansidar (pyrimethane + sulfaloxine), halfan (halofanthrine hypochloride) and quinine are administered. Drug abuse, incomplete dosage and adulterated drugs were considered as the most important causes of resistance. The large number of patent medicine stores in the city whose source of drugs are questionable is thought to be a source of concern. A large number of residents in the high density areas use local herbs as alternative treatments for fevers of different origin. These herbal treatment were usually decoction of roots, leaves and barks extracts in aqueous or alcohol. A wide variety of plant species used singly or in combination include *Citrus medica* (Ijagain), *Enantia chlorantha* (Awopa), *Azadiracta indica* (Dogoyaro), *Khaya senegalensis* (Oganwo), *Alstonia boonei* (Epo ahun), *Mangifera indica* (Mango), *Morinda lucida* (Oruwo), *Pentachlethra macrophylla* (Aidan), *Carica papaya* (Ewe ibepe), *Jatropha carcus* (Botuje), *Manihot* sps (Ewe paki), *Citrus* species (Osan wewe), *Anacardium occidentale* (Cashew), *Piper guineensis* (Iyere) and *Plumbago zeylanica* (Inabiri).

Keywords: Malaria, endemic area, health providers and practices.

INTRODUCTION

Malaria is widespread in many parts of the world mainly in the tropical and subtropical countries and transmission occurs in many temperate regions. However, it is highly distributed in African countries especially along the equatorial region that favour the growth of mosquitoes. Malaria is one of the leading causes of morbidity and mortality in Africa.

Malaria infection is one of the major health problems that require concerted attention and control measures, as it is the most commonly reported disease in Nigeria had been established in urban and rural communities in seemingly healthy individuals examined (Ademowo *et. al.*, 1995). The majority of Nigerians live in rural areas and malaria consistently ranks among the five most

common causes of death in all age groups⁸. In the surveys of residents of the Atlantic coast of Nigeria revealed a lack of knowledge and many misconceptions about the transmission and treatment of malaria among residents of some communities along the atlantic coast of Nigeria (Afolabi, 1996). The successful control programmes of malaria achieved so far relies mainly on knowledge, attitudes, perceptions and practices of individual in the transmission, treatment and control of the disease as incorrect belief or inappropriate behaviour can interfere with the effectiveness of a control measure such as vector control or chemotherapy (Deressa, 1999). The infection has remained one of the greatest causes of debility and mortality particularly in Africa.

In view of these, the investigation aims to study the knowledge, attitude and practices of

inhabitants toward malaria disease and to document the different health providers in Abeokuta and the local medicinal plants used for the treatment of malaria.

Study Area

The survey was conducted in Abeokuta, the capital city of Ogun State, Nigeria. Abeokuta is in the tropical rain forest zone of South Western Nigeria. The nation's main airport, seaport and industrial centre, Lagos is 104 kilometres to the South while Ibadan the largest city in the country is 97 kilometres to the North. The traditional areas are predominantly in the heart of the town and are characterized by poorly constituted houses and haphazardly located. These were designated High Density Areas (HAD). On the other hand, the newer areas represented by estates are better planned with fewer houses per unit of area. They were designated Low Density Areas (LDA).

Residents of households

Residents of eight communities within Abeokuta metropolis were chosen for the study. Five were from the High Density areas while the other three were the housing estates which represent the low density areas. Structured questionnaires were used to obtain demographic information and knowledge, attitudes and practices

Table - 1: Demographic characteristics of respondents of households in Abeokuta city

Characteristics	Estate communities N = 162	Traditional communities N = 563
Number of people		
1 - 5	55 (34%)	77 (14%)
6 - 10	69 (43%)	108 (19%)
11 - 15	31 (19%)	162 (29%)
> 16	7 (4%)	216 (38%)
Occupation		
Civil servants	90 (56%)	138 (25%)
Farming	5 (3%)	52 (9%)
Trading	67 (41%)	373 (66%)
Resident elsewhere		
Yes	45 (28%)	133 (24%)
No	117 (72%)	430 (76%)
Distance from nearest hospital		
0 - 4 km	138 (85%)	502 (89%)
5 - 9 km	18 (11%)	52 (9%)
> 10 km	7 (4%)	9 (2%)

of each household toward mosquito and malaria. Information obtained included the number of people in each household, occupation, resident elsewhere, distance from nearest hospital, experience of mosquito bite, biting time, breeding site and preferred method of prevention of mosquito bite.

Medical Doctors

Structured and semi-structured questionnaires were designed for the purposes of obtaining information from medical practitioners in the government and private hospitals, about the management of malaria. Some of the information sought were sources of malaria drugs, commonly used drugs for treatment, alternative drugs used in cases of resistance, proportion of attendance at hospital due to malaria, commonly observed symptoms of patients presenting with malaria and social status of patients attending hospitals.

Pharmacies and Patent Medicine Stores

Enumeration was carried out to determine the number of pharmacies and patent medicine stores in Abeokuta. Also structured and semi-structured questionnaires were used to obtain information such as qualification of store owners or salespersons, brands of malaria drugs marketed, prescription of drugs to customers, type of drugs usually prescribed, symptoms of malaria and sources of drugs.

Herb Dealers

Enumeration was carried out to locate traditional healers and local traders dealing in plant materials used for treatment of fevers while information were obtained on a variety of these plants and parts used were documented.

RESULTS

A total of 725 households were involved in the study, of which 162 (22%) were from the estates or (LDAs) while 563 (78%) were from the traditional areas or (HDAs). Table 2 shows that most households in the estates (77%) have between 1 and 10 people while in the traditional areas, most households harbour over 10 people (67%). Also most inhabitants in the former are government workers and traders, while in the latter they are mostly traders. Over 70% of the respondents are permanent residents in both areas. Health facilities are located within 4 km of most inhabitants.

Inhabitants of both areas were very familiar with mosquitoes as over 90% have experienced

mosquito bites most of which occur at nights. More people in the low density areas consider mosquito bites harmful but there was no difference in the preference of preventive measures. Bednetting was the least preferred. The respondents were also generally knowledgeable about mosquito breeding sites and associated mosquito with malaria, although knowledge was high in the low density than higher density areas.

Medical Practitioners:

A total of 90 medical practitioners were administered questionnaires, of which 41 (46%) respondents were from government and 49 (54%) private hospitals. The responses to the questions are given in Tables 3 and 4. Drug purchases were mostly by pharmacists in government hospitals (76%), but by medical directors in the private hospitals (63%). Treatment in government/public

Table - 2: Knowledge of inhabitants about mosquitoes and malaria in Abeokuta

Question	Estate communities N = 162	Traditional communities N = 563
Mosquito bite		
Yes	160 (99%)	531 (94%)
No	2 (1%)	36 (6%)
Biting time		
Morning	0 (0%)	13 (2%)
Afternoon	0 (0%)	3 (0%)
Indoor	6 (4%)	38 (7%)
Night	134 (83%)	382 (68%)
Outdoor	22 (13%)	128 (23%)
Mosquito bite harmful		
Yes	148 (91%)	408 (72%)
No	3 (2%)	43 (8%)
Don't know	11 (7%)	112 (20%)
Where mosquitoes breed		
Stagnant water/water	133 (82%)	397 (71%)
Don't know	29 (18%)	166 (29%)
Preferred prevention of mosquito bite		
Bed netting	11 (7%)	49 (9%)
Window/door netting	43 (27%)	160 (28%)
Mosquito coils	38 (23%)	141 (25%)
Insecticides	70 (43%)	213 (38%)
Causes of malaria		
Mosquito bite	157 (97%)	472 (84%)
Don't know	5 (3%)	91 (16%)

Table - 3: Responses of medical practitioners towards management of malaria in Abeokuta

Questions	Government hospital N = 41	Private hospitals/clinics N = 49
Privately owned		49 (54%)
Govt. owned	41 (46%)	
Who purchases drugs for hospital		
Director/		
Chief executive	5 (12%)	31 (63%)
Pharmacist	31 (76%)	17 (35%)
Don't know	5 (12%)	11 (2%)
Source of Drugs		
Payment for treatment		
Free	5 (12%)	0 (0%)
Subsidized	30 (73%)	2 (4%)
Full payment	6 (15%)	47 (96%)
Who brings the sick child to hospital?		
Father	0 (0%)	0 (0%)
Mother	41 (100%)	48 (98%)
Both	0 (0%)	1 (2%)
Proportion of attendance due to malaria		
0 – 20%	2 (5%)	7 (14%)
21 – 50%	5 (12%)	23 (47%)
51 – 70%	29 (71%)	16 (33%)
> 70%	5 (12%)	3 (6%)
Proportion of parents who seek prompt medical attention for their children		
10 – 20%	5 (12%)	7 (14%)
30 – 50%	25 (61%)	29 (59%)
60 – 80%	11 (27%)	31 (27%)
90 – 100%	0 (0%)	0 (0%)
Most Reported Symptoms of malaria		
Fever	41 (100%)	47 (96%)
Headache	41 (100%)	42 (86%)
Body pain	41 (100%)	38 (76%)
Vomiting	40 (98%)	26 (53%)
Loss of appetite	11 (27%)	13 (27%)
Malaise	10 (24%)	1 (2%)
Stooling	2 (5%)	1 (2%)
Jaundice	0 (0%)	4 (8%)

hospitals were usually subsidized while private hospitals charge full payment for treatment. Mothers were often responsible for bringing sick children to the hospitals. With respect to the proportion of attendance at hospitals due to malaria, the government hospitals reckon up to 70% of cases, while in the private, they were between

Table - 4: Responses of medical practitioners to treatment practices in respect of malaria in Abeokuta

Questions	Government hospitals N = 41	Private hospitals/clinics N = 49
First line drug for malaria		
Chloroquine	41 (100%)	49 (100%)
Have you come across cases of chloroquine resistance malaria?		
Yes	41 (100%)	43 (88%)
No	0 (0%)	6 (12%)
How often?		
1-3 persons in 10 cases	35 (85%)	41 (84%)
4 – 6 persons in 10 cases	6 (15%)	5 (10%)
Over 6 persons in 10 cases	0 (0%)	3 (6%)
Alternative drugs in case of chloroquine resistance		
Fansidar	41 (100%)	20 (41%)
Halfan	41 (100%)	20 (41%)
Quinine	36 (88%)	22 (45%)
Artesunate	5 (12%)	5 (10%)
Metakelfin	3 (7%)	2 (4%)
Peflotab	0 (0%)	1 (2%)
Maloxine	0 (0%)	8 (16%)
What is responsible for malaria parasite resistance to first line drug?		
Drug abuse	41 (100%)	29 (59%)
Incomplete dosage	41 (100%)	17 (35%)
Fake drugs	30 (73%)	7 (14%)
Mutation	2 (5%)	0 (0%)
Don't know	0 (0%)	0 (0%)
In how many cases do you seek laboratory diagnosis of malaria before treatment?		
1 – 3 persons in 10 cases	35 (85%)	10 (20%)
4 – 6 persons in 10 cases	6 (15%)	18 (37%)
> 7 persons in 10 cases	0 (0%)	21 (43%)

20% - 70%. The respondents also believed that over 50% of patients seek prompt medical attention. The most important symptoms of malaria commonly presented were fever, headache, body pain and vomiting.

Table - 5: Frequency distribution of knowledge and practices of pharmacists and patent medicine vendors about management of malaria in Abeokuta

Questions	Pharmacists N = 41	Patent medicine vendors N = 310
Respondents		
Owners	8 (20%)	110 (35%)
Salesperson	33 (80%)	200 (65%)
Education level		
Primary	0 (0%)	0 (0%)
Secondary	27 (66%)	228 (73%)
Tertiary	14 (34%)	82 (27%)
Brands of drugs sold for malaria		
Chloroquine	35 (85%)	288 (93%)
Fansidar	35 (85%)	128 (41%)
Maloxine	38 (93%)	195 (63%)
Metakelfin	19 (37%)	0 (0%)
Halfan	10 (24%)	0 (0%)
Nivaquine	6 (15%)	104 (33%)
Camoquine	1 (2%)	0 (0%)
Source of drugs		
Major companies	39 (95%)	32 (10%)
Local suppliers	16 (39%)	282 (91%)
Open markets	4 (10%)	13 (4%)

The survey also showed that the first line drug employed for the treatment of malaria by all medical practitioners in the study area was chloroquine (Table - 4). Most of the practitioners were familiar with cases of malaria resistance against chloroquine in up to 30% of the cases. The alternative drugs were mainly fansidar, halfan and quinine. The most important reasons presented for resistance were drug abuse, incomplete dosage and adulterated drugs. Laboratory diagnosis were sought in about 30% of patients in government hospitals while over 40% in private clinics.

Pharmacy and patent medicine stores operating in the city were enumerated, following which questionnaires were administered to each. The survey showed that 8 (20%) and 110 (35%) of the respondents were owners of the pharmacy and patent medicine stores respectively while the rest were the salespersons (Table - 5). Most of the respondents 66% (pharmacy stores) and 73% (patent medicine stores) had up to secondary education. The brands of malaria drugs mostly sold in both outlets include chloroquine, fansidar and

Table - 6: Knowledge, attitude and practices of native (traditional) Doctors and herb sellers about malaria in Abeokuta

	Native doctors N = 21	Herb sellers N = 95
Respondent		
Owner	13 (62%)	89 (94%)
Salesperson	8 (38%)	6 (6%)
Level of education		
None	7 (33%)	48 (50%)
Primary	11 (52%)	37 (39%)
Secondary	3 (14%)	10 (11%)
Do you sell malaria herbs?		
Yes	18 (86%)	95 (100%)
No	3 (14%)	0 (0%)
Types of herbs sold for malaria		
Mixed (roots, leaves, barks)	21 (100%)	95 (100%)
List of herbs normally prescribed for malaria		
Awopa (<i>Enatia chlorantha</i>)	10 (48%)	43 (45%)
Epo ahun (<i>Alstonia boonei</i>)	4 (19%)	16 (17%)
Aidan (<i>Pentachlethra macrophylla</i>)	3 (14%)	11 (12%)
Ewe ibepe (<i>Carica papaya</i>)	3 (14%)	10 (12%)
Ewe paki (<i>Manihot sp.</i>)	2 (10%)	10 (12%)
Mango (<i>Mangifera indica</i>)	4 (19%)	18 (19%)
Osan wewe (<i>Citrus sp.</i>)	2 (10%)	10 (12%)
Cashew (<i>Anacardium occidentale</i>)	1 (5%)	5 (5%)
Ijagain (<i>Citrus medica</i>)	11 (52%)	47 (49%)
Dogoyaro (<i>Azadiracta indica</i>)	5 (24%)	21 (22%)
Botuje (<i>Jatropha curcass</i>)	3 (14%)	11 (12%)
Oruwo (<i>Morinda lucida</i>)	4 (19%)	18 (19%)
Oganwo (<i>Khaya senegalensis</i>)	5 (24%)	20 (21%)
Iyere (<i>Piper guineensis</i>)	1 (5%)	4 (4%)
Inabiri (<i>Plumbago zeylanica</i>)	1 (5%)	4 (4%)

maloxine. However, none of the patent medicine stores sold both metakelfin, halfan and camoquine. Pharmacies obtained their supplies from major manufacturers with some input from other sources, whereas a majority of the patent stores source from local suppliers.

Herb Dealers

A survey of herb dealers in the metropolis showed that of the one hundred and sixteen (116) respondents, 21 (18%) were native (traditional) doctors while 95 (82%) were herb sellers. Most of them have either no education, 7 (33%) and 48 (50%) or only primary education. All but 3 (14%) sell and dispense herbs used for malaria treatment. Malaria herbs were usually in mixtures of roots, leaves and barks extracted in water or hot drinks.

The following were the medicinal plants used as concoction by herb dealers in Abeokuta city (Table - 6): *Citrus medica* (Ijagain), *Enantia chlorantha* (Awopa), *Azadiracta indica* (Dogoyaro), *Khaya senegalensis* (Oganwo), *Alstonia boonei* (Epo ahun), *Mangifera indica* (Mango), *Morinda lucida* (Oruwo), *Pentachlethra macrophylla* (Aidan), *Carica papaya* (Ewe ibepe), *Jatropha curcass* (Botuje), *Manihot* species (Ewe paki), *Citrus* species (Osan wewe), *Anacardium occidentale* (Cashew), *Piper guineensis* (Iyere) and *Plumbago zeylanica* (Inabiri).

DISCUSSION

The study area, Abeokuta is located in the tropical rain forest of Nigeria. It essentially composed of traditional communities at the center

and modern estates at the periphery. The traditional area assume their high density status due to the higher concentration of houses per unit of area than the estates in the low density areas. Also more people per household were observed in the former than the latter. In the high density areas houses were poorly constructed, most of which lacked toilet facilities and door and window nets for screening mosquitoes. With respect to education, the higher concentration of civil servants in the low density areas and traders and artisan in the high density areas indicate that a higher level of educated people live in the former than the latter. Most health facilities are within 1 - 4 km of the households.

Early diagnosis and treatment at the hospitals or clinics depend upon prompt recognition of symptoms and signs of malaria in the household (Tarimo *et. al*, 1998). Malaria as a febrile illness is included in the Integrated Management of Childhood Illness (IMCI) strategy which aims to improve health systems and improve family and community practices regarding management of childhood illness (Goves, 1997). Understanding community perceptions of aetiology, symptom, identification and treatment of malaria is an important step towards the control of the disease (Deressa, 1999; Molyneaux *et. al*, 1999).

Many of the households are knowledgeable about the fact that mosquito is associated with malaria and therefore prevention of mosquito bites would reduce malaria infection. This perception in the present study is higher to the level noted in Ethiopia (Deressa, 1999) and Nigeria (Afolabi, 1996). This may be due to various current malaria control intervention and awareness over the last periods of previous studies. In addition, the medically accepted symptoms of malaria are also generally known. The preferred use of window/door netting, mosquito coil and insecticides by residents of both low and high density areas for preventing mosquito bites is indicative of their knowledge on mosquito control. However, it is to be pointed out that most of the houses in the traditional areas are without window or door netting as an integral part of the houses. This is indicative of the socio-economic status of the residents. However, the use of bednets for prevention was very low in both groups. Insecticide Treated Bed Nets (ITBN) are currently being promoted for use in the Role-Back Malaria (RBM) programme (Habluetzel *et. al*, 1999). The lack of interest or awareness in bed-net use may have grave

implications for the success of the programme. This therefore underscores the need for more public enlightenment in this regard. Most health providers held the belief that fever, headache, body pain and other enteric symptoms such as vomiting were the most important symptoms of malaria in Abeokuta. These symptoms have also been shown to be common elsewhere (Tarimo *et. al*, 1998).

The importance of malaria as a public health problem was confirmed by health providers who reckon that over half of the hospital attendance was due to malaria infection. However, the proportion of patients who seek prompt medical attention was lower and did not differ between public and private health centres. The inability of this proportion to seek medical attention could lead to complication and death. Since complicated malaria is associated with very high mortality among children, health education interventions should focus on improving health providers' and communities' perceptions and knowledge to recognize the link between malaria and the most important symptoms (Tarimo *et. al*, 2000).

Chloroquine remains the first line drug among clinicians in private and government owned hospitals, however resistance to the drug has been widely reported (Salako, 1999; Sowunmi *et. al*, 2001a). In this investigation, a very high proportion of the clinicians have come across the problem of drug resistance in patients, indicating that it may be widespread in this locality. They recognize drug abuse (incomplete dosage) and fake drugs as the main cause of malaria drug resistance. These have also been documented by (Sowunmi *et. al*, 2001b; Trape, 2001). This finding have important implications for the management of drug resistance to malaria as previously reported (Ministry of Health, Tarzania, 1997; Cheesbrough, 1998) that laboratory tests are essential and necessary to ascertain diagnosis and limit over use of drugs and to monitor efficacy.

In sub-Saharan Africa, the frequent and early use of shop-bought antimalarials in household responses to fever and malaria have been documented (Vundule and Mharakurwa, 1996). Most studies have shown that purchasing shop-bought drugs constitutes very high proportion, in most cases as a first-line response (Chiquzo, 1999). The attraction of shop-bought drug is rational. There are numerous shops offering a cheap and convenient service relative to even nearby government and private hospitals, and drugs are readily available and in many cases cure

alleviate patients symptoms (Molyneaux *et. al*, 1999). In this study the number of patent medicine shops far outnumber the pharmacies. The increased number of these shop is indicative of their attractiveness to patronage by residents. More often than not, drugs bought from these shops are cheaper than elsewhere. However the risk of fake drugs which contribute to resistance is higher than in the government hospitals and pharmacies because, while the latter obtain their supplies from major manufacturers, the former buy their drugs more from the local supplies whose sources may be questionable. It is therefore important that as a means of stemming fake drugs, patent medicine stores must regularly be scrutinized by the appropriate government agency to reduce the incidence of fake or adulterated drugs.

In addition, medicinal plants in the form of concoctions play a prominent role in the treatment of malaria and sometimes as prophylaxis as observed in this study and elsewhere in Nigeria. However, previous authors have observed that dosages are not measured and side effects are

not taken into consideration (Agomo *et. al*, 1992). In the study in Oyo state, it was observed that a large number of plant species were claimed to be effective against malaria (Afolabi, 1996). The list is however endless as is the case in this study. The popularity of each plant depends on locality, for instance *Azadiracta indica* seem to be universal (Agomo, 1991). Conversely, plants such as *Cassia occidentalis* and *Gulera senegalensis* are popular in Northern localities (Etkin and Ross, 1983), *Morinda lucida*, *Gymbopogon citrates* and *Carica papaya* are popular in the southern states (Makinde and Obi, 1985; Odetola and Bassir, 1986). From many traditional healers and herb sellers interviewed, usually the feverish patient consumes either the aqueous or the alcoholic concoction of the medicinal plants in a dosage of one to three cups daily for several days to treat malaria. Since no one can stop the poor masses from practicing what they believe in, an attempt should be made by appropriate Government agencies to formulate safe dosages of some non-toxic decoctions (Agomo, 1991). The lack of dosage control could also be a factor in malaria resistance.

REFERENCES

- Ademowo, D.G., Falusi, A.G. and Mewoyeka, O.O. Prevalence of asymptomatic parasitaemia in an urban and rural community in South Western Nigeria. *Central Africa Journal of Medicine*. **41**: 18 - 21 (1995)
- Afolabi, B.M. Knowledge attitude and practices of malaria in an isolated community in the Atlantic Coast of Lagos, Nigeria. *Malaria and Infectious Diseases in Africa*. **4**: 6 - 13 (1996)
- Agomo, P.U. Herbal Medicine: Malaria and Health care delivery. The need for caution. *Medicare Journal*. **4**: 26 - 29 (1991)
- Agomo, P.U., Idigo, J.C. and Afolabi, B.M. "Antimalaria" medicinal plants and their impact on cell populations on various organs of mice. *African Journal of Medical Science*. **21**: 39 - 46 (1992)
- Cheesbrough, M. Importance of laboratory practice in district health services. In: District Laboratory practice in Tropical countries, Part I. Tropical Health Technology, Cambridge. 1 - 3 (1998)
- Chiquzo, A.N. Factors associated with the occurrence of malaria epidemics. The case of Hurumasa peri-urban Eldoret municipality, Kenya. Poster presented at the MIM African Malaria Conference. 14 - 19 March MIM African Malaria Conference, Durban, South Africa. (1999)
- Deressa, W. Knowledge, Attitude and Practice About Malaria, the Mosquito and Antimalaria Drugs in Rural Community. *Ethiopia Journal of Health Development*. **17**: 99 - 104 (1999)
- Etkin, N.C. and Ross, P.J. Malaria, medicine and meals: Plant use among the Hausa and its impact on disease. In: The anthropology of medicine from culture to method. Romannci - Ross (Ed.). New York. 231 - 259 (1983)
- Goves, S. Integrated management of childhood illness by out-patient health workers: technical basis and overview. *Bulletin of the World Health Organisation*. **75** (suppl. 1): 7 - 24 (1997)
- Habluetzel, A., Cuzin, N., Diallo, D.A., Nebie, I., Belem, S., Cousens, S.N, and Esposito, F. Insecticide-treated curtains reduce the prevalence and intensity of malaria infection in Burkina Faso. *Tropical Medicine and International Health*. **4**: 557 - 564 (1999)
- Makinde, J.M. and Obi, P.O. Screening of *Morinda lucia* leaf extract for antimalarial action on *Plasmodium berghei* in mice.

- African Journal of Medicine and Sciences*. **14**: 59 - 63 (1985)
12. Ministry of Health, Tanzania Case management of malaria. In: Prescriptive manual for Diagnosis and Treatment of malaria in Tanzania. Malaria Control Unit, Ministry of Health, Dar es Salam, Tanzania. 46 - 66 (1997)
 13. Molyneaux, C.S., Mung'ala-Odera, V., Harpham, T. and Snow, R.W. Maternal response to childhood fever: a comparison of rural and urban resident in coastal Kenya. *Tropical Medicine and International Health*. **4**: 836 - 845 (1999)
 14. Odetola, A.A. and Bassir, O. *Evaluation of antimalarial properties of some Nigerian medicinal plants*. In: *The State of Medicinal Plant Research in Nigeria*. Sofowora A.(Ed). Ibadan, University Press. 220 - 230 (1986)
 15. Salako, L.A. Malaria control priorities and constraints. *Parasitologia*. **41**: 495-496 (1999)
 16. Sowunmi, A., Adedeji, A.A., Sowunmi, C.O., Falade, A.G., Ohaeri, B., Happi, T.C. and Oduola, A.M. Clinical characteristics and disposition kinetics of the hepatomegaly associated with acute, uncomplicated *Plasmodium falciparum* malaria in children. *Annals of Tropical Medicine and Parasitology*. **95**: 7 - 18 (2001a)
 17. Sowunmi, A., Ayede, A.I., Falede, A.G., Ndikum, V.N., Sowunmi, C.O., Adedeji, A.A., Falade, C.O., Happi, T.C. and Odunola, A.M. Randomized comparison of chloroquine and amodiaquine in the treatment of acute, uncomplicated *Plasmodium falciparum* malaria in children. *Annals of Tropical Medicine and Parasitology*. **95**: 549 - 558 (2001b)
 18. Tarimo, D.S., Lwihula, G.K., Minjas, J.N. and Bygbjerg, I.C. Mothers' perceptions and knowledge in childhood malaria in the holoendemic Kibaha district, Tanzania: Implications for malaria control and the IMCI strategy. *Tropical Medicine and International Health*. **5**: 179 - 184 (2000)
 19. Tarimo, D.S., Urassa, D.P. and Msamanga, G.I. Caretakers perceptions of the clinical manifestations of childhood malaria in holoendemic rural communities in Tanzania. *West African Medical Journal*. **75**: 93 - 96 (1998)
 20. Trape, J.F. The public health impact of chloroquine resistance in Africa. *American Journal of Tropical Medicine and Hygiene*. **64**: 12 - 17 (2001)
 21. Vundule, C. and Mharakurwa, S. Knowledge, Practices and Perceptions about malaria in rural communities of Zimbabwe: Relevance to malaria control. *Bulletin of the World Health Organization*. **74**: 55 - 60 (1996)