Nigerian Journal of Paediatrics 2005, 32(2) 40-46

The Influence of Maternal Socioeconomic Status on the Management of Malaria in their Children: Implications for the 'Roll Back Malaria' Initiative

TA Ogunlesi[+], JAO Okeniyi[++], GA Oyedeji[+++], OA Oyedeji[*]

Summary

Ogunlesi TA, Okeniyi JAO, Oyedeji GA, Oyedeji OA. The Influence of Maternal Socioeconomic Status on the Management of Malaria in their Children: Implications for the 'Roll Back Malaria' Initiative. *Nigerian Journal of Paediatrics* **2005; 32:40.**

Background: Early recognition of symptoms of malaria and commencement of appropriate and effective therapy are vital elements of the Roll Back Malaria Initiative which is aimed at reducing the impact of malaria.

Objective: To determine the influence of the socioeconomic status of mothers on their knowledge of the symptoms of malaria and its management in their children.

Design: Prospective, hospital-based survey.

Methods: Mothers of under-five children with fever were tested for their ability to recognize the symptoms of malaria by asking them the question "what do you feel is the problem with your child?" Semi-structured questionniars were administered to those who correctly made the verbal diagnosis of malaria, seeking information on the various forms of treatment they gave their children before presentation in the hospital.

Mothers in the upper and lower social classes were statistically compared in terms of antimalarial drug usage before presentation, sources of drugs given to children with suspected malaria and their knowledge and attitude to intramuscular injections.

Results: Two hundred and eight (84.6 percent) of the 246 mothers studied had administered drugs to their children at home before presentation at the hospital. Early presentation in the hospital ($p < 0.0001$), drug administration within 24 hours of onset of symptoms ($p < 0.0001$) and disapproval of intramuscular injections ($p = 0.017$) were significantly higher among mothers from the upper social class. Conversely, procurement of drugs from primary health centres ($p = 0.006$), polypharmacy ($p = 0.0005$), use of poorly formulated branded products ($p = 0.005$) and injections received prior to hospital visit ($p = 0.02$) were significantly higher among respondents from the lower social class.

Conclusion: Low socio-economic status is associated with poor management of a child with malaria. It is also associated with practices that may encourage parasite resistance and treatment failure.

Key words: Child care, malaria, socioeconomic status

Introduction

IT is estimated that malaria causes about a third of the annual 12 million deaths of under-five children in the developing world.[1,2] In tropical Africa where malaria transmission is high, childhood deaths from malaria are reported to amount to approximately one million per annum while about 10 percent of survivors of severe malaria suffer sequelae such as hemiplegia, cortical blindness and behavioural disorders.[3] In Nigeria, malaria transmission is holoendemic and severe forms of the disease usually occur among children older than six

Wesley Guild Hospital, Ilesa

Department of Paediatrics
[+]Senior Registrar
[++]Lecturer/ Consultant Paediatrician

Obafemi Awolowo University, Ile Ife

Department of Paediatrics and Child Health
[+++]Professor/ Consultant

State Hospital, Osogbo
[*] Consultant Paediatrician

Correspondence: Dr TA Ogunlesi;
E-mail : tinuade_ogunlesi@yahoo.co.uk

months, with the greatest mortality in the pre-school age.[1,3] In malaria endemic areas, most if not all children are infected by the malaria parasite in childhood. A vast majority do not develop severe malaria. Consequently, partially effective drug control measures may lead to increased incidence of severe malaria because of the development of resistance to commonly used drugs by the parasites.[4] The failure of the previous global malaria control measures led to the introduction of the 'Roll Back Malaria (RBM)' Initiative by the World Health Organization (WHO).[2] The major goal of the programme is early treatment of people at risk of malaria in order to achieve clinical cure. The population at risk must be able to recognize the symptoms of malaria and commence effective antimalarial therapy within 24 hours of the illness.[5-7] Chloroquine remains the antimalarial drug of choice since it is affordable and relatively effective. However, there are increasing reports of significant levels of parasite resistance to this drug in Nigeria.[8,9]

In the light of the above, this study was carried out to assess the status of the RBM Initiative at the individual level in Ilesa, a semi-urban Nigerian community. The objectives of this study include the determination of the ability of mothers to recognize the symptoms of malaria, the practice of the mothers in the care of malaria in their children, and the effect of the socioeconomic status of the mothers on these attributes.

Patients and Methods

This prospective study was carried out over a period of five weeks (June-July, 2004), at the Paediatric General Outpatients Clinic of the Wesley Guild Hospital, Ilesa which is a unit of the Obafemi Awolowo University Teaching Hospitals Complex, Ile Ife. This tertiary health institution provides general and specialist paediatric care for the semi-urban population of Ijesaland and contiguous communities in Osun, Ondo and Ekiti states. The study population comprised the mothers of under-five children who presented with fever as a major complaint. Excluded from the study were other care givers and mothers of children aged six months or less. Mothers whose children had catarrh, cough, ear discharge, skin rash and inability to swallow were also excluded.[5] The children were clinically evaluated by paediatric senior registrars, while the mothers were asked the question: 'What do you feel is the problem with your child?' in Yoruba or English language. Those who replied that the child had malaria, '*iba*' or '*ako-Iba*' were recruited; the Yoruba words '*Iba*' and '*Ako-Iba*' being the most commonly used words for malaria in the community. The clinical diagnosis of malaria was confirmed with the demonstration of malaria parasites in the blood film. The maternal verbal diagnosis of malaria was adjudged to be "correct" when it matched the diagnosis made by the attending physicians.

A semi-structured questionnaire designed for the study was administered on the mothers. Information gathered included personal data, details of educational qualifications and occupation of the child's parents, the drugs given before presentation, interval between the onset of illness and commencement of drug therapy and parents' knowledge about the dangers of intramuscular injections, such as painful swellings, inability to walk and the risk of paralysis.

The respondents were stratified into two groups for the purpose of comparison using the method recommended by Oyedeji.[10] People in socioeconomic classes I, II and III were grouped together as the Upper Class while those in classes IV and V were grouped together as the Lower Class.[10]

The data was analysed using SPSS software; p-values less than 0.05 were accepted as significant.

Results

Characteristics of the subjects and presenting symptoms

A total of 325 under-five children presented with fever and other features of uncomplicated malaria at the clinic during the five-week period. Children with other obvious causes of fever and those aged below six months were excluded. Seventy-nine (24.3 percent) of the 325 children were excluded because their mothers either offered verbal diagnosis of other conditions (52; 65.8 percent) or did not offer any diagnosis (27; 34.2 percent). The remaining 246 (75.7 percent) in whom the diagnosis of malaria was correctly made, were studied further. Their ages ranged from six months to 59 months [mean (SD) 15.4 (11.1) months]. Two hundred and twelve (86.2 percent) were 24 months old or less while 130 were males. In addition to fever, other symptoms included anorexia in 68 (27.6 percent), vomiting in 35 (14.2 percent), anorexia with weakness in 34 (13.8 percent), vomiting with weakness in 28 (11.4 percent), anorexia with vomiting in 20 (8.2 percent) and diarrhoea in five (2.0 percent).

Duration of illness and drug treatment before presentation

One hundred and fourteen children (46.3 percent) presented within two days of the illness while the remaining 132 (53.7 percent) presented between days 3 and 7. Two hundred and eight (84.6 percent) mothers administered various drugs to their children prior to presentation in the hospital. The drugs, which were mostly taken in combination, included antimalarial drugs [like chloroquine, amodiaquine and sulphadoxine/pyrimethamine (S/P)], co-trimoxazole, paracetamol and haematinics. Out of the 246 children, 174 (70.7 percent) had paracetamol, 114 (46.3 percent) received satisfactory

forms of antimalarials, 59 (23.9 percent) received certain branded products containing chloroquine or quinine, paracetamol and promethazine in various but suboptimal concentrations. Drugs were administered to 174 (70.7 percent) of 246 children within 24 hours of the onset of symptoms.

Only four respondents who belonged to the upper social class, used S/P. All the respondents denied using local herbal mixtures. The drugs used were procured from local pharmacy shops (102; 49.0 percent), primary health centres (53; 25.5 percent), private medical clinics (19; 9.1 percent), and general hospital (14; 6.7 percent), while others were leftovers from drugs previously obtained from the Wesley Guild Hospital (20; 9.7 percent).

Influence of socioeconomic status

One hundred and eighty four (74.8 percent) of the mothers belonged to the upper socioeconomic class while 62 (25.2 percent) were in the lower class. The 79 mothers who offered no diagnosis or gave incorrect diagnosis comprised 21 (10.2 percent) of 205 from the upper social class and 58 (48.3 percent) of 120 in the lower social class (χ^2 = 59.7, p <0.00001). Furthermore, a significantly higher proportion of mothers from the upper social class (104/184; 56.5 percent) presented their children in the hospital within two days of the onset of symptoms compared with 10 (16.1 percent) of 62 mothers in the lower social class (χ^2 = 30.4, p <0.00001).

Table I compares the various sources of drugs received prior to presentation in the hospital according to the family social classes. A significantly higher proportion of mothers from the lower social class patronised the primary health centres than the ones from the upper social class. An analysis of the numbers of children that had intramuscular injections prior to presentation (Table II), showed that a significantly higher proportion of children from the lower social class received intramuscular injections for the treatment of malaria than children from the higher social class. Similarly, patronage of the primary health centres for injections was significantly higher among children in the lower social class (16/62 vs 19/184; X^2 = 9.1, p =0.003).

Table III shows that significantly higher percentages of respondents from the lower social class admitted giving their children three or more drugs before presentation, using paracetamol and poorly formulated branded drugs, and using antimalarial drugs at wrong intervals and for inappropriate duration. While a significantly higher proportion (19 percent) of mothers from the higher social class had no preference for intramuscular injections, a significantly higher proportion of respondents from the lower social class lacked adequate knowledge about the risks of injections (Table IV).

Discussion

Timely and appropriate disease management are essential elements of the Global Malaria Control Strategy.[2] The strategy is aimed at avoiding the progression of mild uncomplicated malaria to severe life threatening disease and protecting the available effective drugs against parasite resistance. This in turn, is pivoted on early diagnosis and effective treatment of malaria. Specifically, the RBM Initiative encourages the population at risk to recognize the symptoms of malaria and start effective drug treatment at home because access to health facilities where formal treatment is usually instituted may be poor. The latter has been identified as a cause of delay in instituting appropriate therapy.[2] The high rate of drug

Table I

Socioeconomic Classes and Sources of Drugs given to Children with suspected Malaria

Sources of Drugs	*Number (percent) of Mothers from the Social Classes*		*p value*
	Upper n = 184	*Lower n = 62*	
Local pharmacy shops	72(39.1)	30(48.4)	0.2
Primary health centres	32(17.4)	21(33.9)	0.006
Wesley Guild Hospital	16(8.7)	4(6.5)	0.78*
Private medical clinics	17(9.2)	2(3.2)	0.17*
General hospitals	10(5.4)	4(6.5)	0.8*

Figures in parentheses are percentages of the total in each column
* Fisher's Exact Test.

Table II

Socioeconomic Classes and Rate of Intramuscular Injections received prior to Presentation

Intramuscular Injections	*Number (percent) of Mothers from the Social Classes*		*p value*
	Upper n = 184	*Lower n = 62*	
Received by their children prior to presentation	31(16.8)	19(30.6)	0.02
Locations where the injections were administered			
Primary health centres	19(10.3)	16(25.8)	0.03
Private medical clinics	8(4.3)	1(1.6)	0.45*
Local chemist shops	4(2.2)	2(3.2)	0.64*

Figures in parentheses are percentages of the total in each column.
*Fisher's Exact Test.

Table III

Socioeconomic Classes and Drug Usage for Malaria before Presentation

Drug Usage	*Number (percent) of Mothers from the Social Classes*		*p value*
	Upper n = 184	*Lower n = 62*	
Drug use prior to presentation	147 (79.9)	61 (98.4)	0.0005
Drug use within 24 hours of symptoms	140 (76.1)	34 (54.8)	0.001
Antimalarial drug use	76 (41.3)	28 (45.2)	0.5
"Branded products" use	36 (19.6)	23 (37.1)	0.005
Paracetamol use	120 (65.2)	57 (91.9)	0.00005
Number of drugs taken prior to presentation			
One	52 (28.3)	11 (17.7)	0.1
Two	42 (22.8)	12 (19.4)	0.56
Three or more	53 (28.8)	38 (61.3)	0.0005
Wrong doses of antimalarials	63 (34.2)	35 (56.5)	0.002
Wrong intervals between doses of antimalarials	22 (12.0)	26 (41.9)	< 0.00001
Wrong duration of antimalarial treatment	5 (2.7)	12 (19.4)	0.00004

Figures in parentheses are percentages of the total in each column

use prior to presentation in this study is in keeping with the principle of RBM although it appears to stem from the culture of self medication which characterizes medical care in the developing world.[11, 12]

Asking the mothers to make verbal diagnosis of malaria, tested their ability to recognize the symptoms of malaria which is a rate-limiting step in the challenge of commencing appropriate treatment early in the illness. The fact that about three quarters of the mothers in this study could correctly make verbal diagnosis of malaria is encouraging. Unfortunately, this feat is diluted by the fact that less than half of them actually administered appropriate antimalarial drugs to their children prior to presentation in the hospital. The high rate of paracetamol use which is popular within and outside Nigeria,[12-15] must be discouraged. The antipyretic effect of paracetamol

Table IV

Socioeconomic Classes and Preference of Mothers for, and Knowledge of the Possible Complications of Intramuscular Injections

Knowledge and Attitude of Mothers	*Number (percent) of Mothers from the Social Classes*		*p value*
	Upper $n = 184$	*Lower* $n = 62$	
Preference for injections			
Yes	30 (16.3)	13 (21.0)	0.4
No	35 (19.0)	2 (3.2)	0.017*
Indifferent	119 (64.7)	47 (75.8)	0.1
Ability to identify dangers of injections	171 (92.9)	53 (85.5)	0.075
Dangers of intramuscular injections identified**			
Painful swelling of the site/limb	143 (77.7)	30(48.4)	0.000012
Inability to walk	62 (33.7)	29(46.8)	0.065
Paralysis of the limb	0 (0.0)	0(0.0)	-

Figures in parentheses are percentages of total
*Fisher's Exact Test
** Some respondents identified multiple dangers

may be useful but there are significant, though yet unconfirmed fears[16] that it may delay parasite clearance and more importantly, delay effective antimalarial treatment and thus increase the risk of developing severe forms of the disease. The extensive use of branded and poorly formulated drugs also technically amounts to inadequate treatment which may encourage treatment failure and increase the risk of severity. This problem should be tackled with appropriate surveillance and interventions by the Pharmacy Board and the relevant drug and health agencies of the government. Enforceable legislation may be required to stem this practice.

Although the level of parasite resistance to chloroquine has not been previously documented in this centre, various degrees of such resistance have been reported in Nigeria and other countries.[8,9,17] Therefore, sulphadoxine/pyrimethamine (S/P) should be considered as an alternative to chloroquine as a first line drug in the treatment of uncomplicated malaria. Such a practice, though supported by various reports from other parts of Africa,[18-20] appears not to be popular yet as only four respondents in the present study administered S/P to their children. A recent report from Uganda that chloroquine which is cheaper than S/P is still effective, is therefore welcome especially if studies from various parts of the Nigeria confirm a continued high sensitivity of the malaria parasite to chloroquine.[21]

The poor knowledge of the respondents about dosage and spacing of doses of antimalarial drugs found in the present study is consistent with reports from other parts of Nigeria and other developing countries where drug prescription is poorly controlled.[14,15,22] Higher than recommended doses of antimalarials may be lethal while lower doses may encourage parasite resistance, treatment failure and increasing severity of the disease. Education to correct the problem of wrong dosages should be aimed at mothers and prescription writers, among whom there have been reports of serious errors in prescribing.[13,23,24]

Although the proportion of children who received injections was low, it is instructive that most of the injections were administered at primary health centres and alarming that some of the children who received injections in the local pharmacy shops and clinics may have been injected by quacks as has also been reported elsewhere.[22,25] The implications of this on the efforts to control Human Immunodeficiency and Hepatitis B Virus diseases apart from other risks, are serious. It is noteworthy that most of the respondents know about the risks of intramuscular injections. Nevertheless, education about these risks should be pursued with vigour to change the attitude of those who still prefer this to the oral route. Health workers must understand that there are few indications such as complicated malaria, for parenteral chloroquine administration.[2,26]

The influence of socioeconomic status on child care has earlier been reported.[10,27] It has been stated that care givers from the upper social classes are likely to have greater access to health information as well as appropriate medical care.[10,27] Thus in the present study,

mothers in the lower social class were less able to correctly make a verbal diagnosis of malaria. This is in contrast to the respondents in the upper social class who not only made the correct diagnosis, but tended to take their children to the hospital early in the illness; a relatively higher proportion also administered antimalarial drug within 24 hours of the onset of symptoms, used monotherapy and did not prefer intramuscular injections. Moreover, mothers in the lower class may not be able to take the most cost-effective decision concerning their ill children not only because they are less hospital-conscious and ignorant but also because they are poor. Unfortunately, such mothers tended to waste their scanty finances on unhelpful treatment.

We suggest that well thought-out and directed education on the various aspects of malaria control should receive due emphasis in the RBM initiative. Armed with adequate information, mothers in Guinea Bissau demonstrated ability to administer antimalarial drugs appropriately to their children at home.[28] It may be appropriate for drug manufacturers and marketers to make provision for administration guidelines in the local major languages which can be understood by the mothers.

The findings in the present study have touched on some of the factors militating against the success of the RBM initiative. We appreciate that making antimalarial drugs available only on prescriptions will delay commencement therapy. We however, suggest that the appropriate governmental health and drug agencies mount effective surveillance and control of drug manufacturing and marketing activities to curb malpractices; this should be backed if necessary, by legislation. Emphasis on education should also be directed to teaching mothers and other care givers about early recognition, correct and timely management of malaria, as well as training and retraining of primary health workers. Advocacy should be put in place to ensure the provision of subsidized effective antimalarial therapy especially for women in the lower social classes in order to sustain the RBM programme in the community. There is also a need to enhance the understanding of the other components of the programme that concern individual families like the use of insecticide treated nets and materials.

References

1. WHO Division of Control of Tropical Diseases. Severe and complicated malaria. *Trans R Soc Trop Med Hyg* 1990; **84**: Suppl 2: 1-65.
2. WHO. Expert Committee on Malaria. Twentieth Report: WHO, Geneva, 1997.
3. Ogala WN. Malaria. In: Azubuike JC, Nkanginieme KEO, eds. Paediatrics and Child Health in a Tropical Region. Owerri: African Educational Series. 1999: 426-37.
4. Snow RW, Omumbo JA, Lowe B *et al*. Relation between severe malaria morbidity in children and level of Plasmodium falciparum transmission in Africa. *Lancet* 1997; **349**: 1650-4.
5. WHO. Integrated Management of Childhood Illnesses. WHO, Geneva, 1997 (WHO/CD/97.3).
6. WHO. Implementation of global malaria control strategy. Report of a WHO Study Group on the Implementation of the Global Plan of Action for Malarial Control 1993-2000. WHO, Geneva. World *Health Organ Tech Rep Ser* 1993; **839**: 1-57.
7. Olaleye BO, Williams LA, D'Alessandro U, Weber MM, Mulholland K, Okorie C, Langerock P, Bennett S, Greenwood BM. Clinical predictors of malaria in Gambian children with fever or a history of fever. *Trans R Soc Trop Med Hyg* 1998; **92**: 300-4.
8. Olanrewaju WI, Johnson AW. Chloroquine-resistant Plasmodium falciparum malaria in Ilorin, Nigeria: prevalence and risk factors for treatment failure. *Afr J Med Med Sci* 2001; **30**: 165-9.
9. Sowunmi A, Fateye BA. Plasmodium falciparum gametocytaemia in Nigerian children: before, during and after treatment with antimalarial drugs. *Trop Med Int Health* 2003; **8**: 783-92.
10. Oyedeji GA. The effect of socio-economic factors on the incidence and severity of gastroenteritis in Nigerian children. *Nig Med J* 1987; 4: 229–32.
11. Osinusi K, Oyejide CO. Child care practices with respect to acute respiratory tract infection in a poor, urban community in Nigeria. *Rev Infect Dis* 1990; **12**: S1039-41.
12. Muller O, Traore C, Becher H, Kouyate B. Malaria morbidity, treatment-seeking behaviour, and mortality in a cohort of young children in rural Burkina Faso. *Trop Med Int Health* 2003; **8**: 290-6.
13. Fawole OI, Onadeko MO. Knowledge and management of malaria in under five children by primary health care workers in Ibadan South-east local government area. *Niger Postgrad Med J* 2001; **8**: 1-6.
14. Fawole OI, Onadeko MO. Knowledge and home management of malaria fever by mothers and care givers of under five children. *West Afr J Med* 2001; **20**: 152-7.
15. Clarke SE, Rowley J, Bogh C, Walraven GE, Lindsay SW. Home treatment of 'malaria' in children in rural Gambia is uncommon. *Trop Med Int Health* 2003; **8**: 884-94.
16. Meremikwu M, Logan K, Garner P. Antipyretic measures for treating fever in malaria. Cochrane Database Syst Rev 2000: CD002151.
17. Oduro AR, Anyorigiya T, Adjuik M, Afful TM, Anto F, Atuguba F, Owusu-Agyei S, Hodgson A. A randomized, comparative study of two regimens of beta-artemether for the treatment of uncomplicated, Plasmodium falciparum malaria, in northern Ghana. *Ann Trop Med Parasitol* 2004; **98**: 433-40.
18. East African Network for Monitoring Antimalarial Treatment

(EANMAT). The efficacy of antimalarial monotherapies, sulphadoxine-pyrimethamine and amodiaquine in East Africa: implications for sub-regional policy. *Trop Med Int Health* 2003; **8**: 860-7.

19. Williams HA, Kachur SP, Nalwamba NC, Hightower A, Simoonga C, Mphande PC. A community perspective on the efficacy of malaria treatment options for children in Lundazi district, Zambia. *Trop Med Int Health* 1999; **4**: 641-52.
20. Verhoeff FH, Brarbin BJ, Masache P, Kachale B, Kazembe P, Van der Kaay HJ. Parasitological and haematological responses to treatment of Plasmodium falciparum malaria with sulphadoxine-pyrimethamine in southern Malawi. *Ann Trop Med Parasitol* 1997; **91**: 133-40.
21. Ndyomugyenyi R, Magnussen P, Clarke S. The efficacy of chloroquine, sulphadoxine-pyrimethamine and a combination of both for the treatment of uncomplicated Plasmodium falciparum malaria in an area of low transmission in western Uganda. *Trop Med Int Health* 2004; **9**: 47-52.
22. Ezedinachi EN, Ejezie GC, Emeribe AO. Problems of chloroquine-resistant P. falciparum in Nigeria: one antimalarial drug's utilization in metropolitan Calabar. *Cent Afr J Med* 1991; **37**: 16-20.
23. Ogwal-Okeng JW, Obua C, Waako P, Aupont O, Ross-Degan D. A comparison of prescribing practices between public and private sector physicians in Uganda. *East Afr Med J* 2004; Suppl: S12-6.
24. Obua C, Ogwal-Okeng JW, Waako P, Aupont O, Ross-Degan D. Impact of an educational intervention to improve prescribing by private physicians in Uganda. *East Afr Med J* 2004; Suppl: S17-24.
25. Ofori-Adjei D, Arhinful DK. Effect of training on the clinical management of malaria by medical assistants in Ghana. *Soc Sci Med* 1996; **42**: 1169-76.
26. Giadom B, de Veer GE, van Hensbroek MB, Corrah PT, Jaffar S, Greenwood BM. A comparative study of parenteral chloroquine, quinine and pyrimethamine-sulphadoxine in the treatment of Gambian children with complicated, non-cerebral malaria. *Ann Trop Paediatr* 1996; **16**: 85-91.
27. Esimai OA, Ojofeitimi EO, Oyebowale OM. Sociocultural practices influencing under five nutritional status in an urban community in Osun State, Nigeria. *Nutr Health* 2001; **15**: 41-6.
28. Kofoed PE, Lopez F, Aaby P, Hedegaard K, Rombo L. Can mothers be trusted to give malaria treatment to their children at home? *Acta Trop* 2003; **86**: 67-70.