

Full Length Research paper

How far have we rolled back malaria on the African continent nine years down? The burden of malaria among pregnant women in a semi-urban community of northern Nigeria.

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Malaria has continued to constitute a serious public health issue in Nigeria nine years since the domestication of the 'roll back malaria' (RBM) programme in Africa. This study was therefore carried out to ascertain the burden of malaria among ante-natal women in a semi-urban community of Benue state. The study was hospital based. Pregnant women attending clinics for their routine ante-natal services were consecutively recruited into the study. Questionnaires were administered to obtain relevant information such as: age, number of previous pregnancies, literacy level, feeding habits, number of children, and ownership and use or otherwise of insecticide treated bed nets (ITNs). Capillary blood samples were obtained using sterile lancet where thick and thin blood films were made, fixed and stained using Giemsa's method, then air dried and examined microscopically for malaria parasites. Micro-capillary tubes were used to collect capillary blood, sealed and centrifuged in microhaematocrit machine where Packed cell volume (PCV) was estimated. Data obtained was analysed using Epi Info 6 statistical software. The incidence of malaria was found to be 42.4% (308/726) of which anaemia (PCV < 28%) was recorded in 71.6% (221/308) of them. Those who used insecticide treated bed nets (ITNs) were 22.7% (165/726) while 32.6% (237/726) used untreated bed nets. There was a significant increase in the rate of malaria with a proportionate decrease in use of ITNs ($P < 0.001$). A significantly higher rate of infection was recorded among those who were uneducated compared to the educated; 67.9% (253/377) for Nil, 22.1% (38/172) for primary, 8.9% (11/133) and 12.9% (7/54) for secondary and tertiary education respectively, ($P < 0.001$). In view of the high malaria load among inhabitants of Otukpo and environs; efforts should be intensified towards supply and distribution of ITNs, adult education as well as public sensitization towards malaria control.

Key Words: Malaria, infection, ante-natal, women.

INTRODUCTION

The fact that malaria is still a disease of serious public health importance draining the lean economic fortunes of African countries is incontestable (Hopkins et al., 2007; and Patterson et al., 2006). Besides the over a million deaths, primarily pregnant women and children, the disease causes yearly in SubSaharan Africa, the disease is believed to contribute in no small measure to the poverty bedevilling Africa in to the 21st century (Nsimba et al., 2008; Meremikwu et al., 2001; and Oberlander and Elverdan 2000). The disease is in fact in conflict with the efforts of both local and international organizations working in consonance to put it under control (UN, 2000; and Narasimhan and Attaran, 2003).

Malaria burden presently in Africa varies from country to country. In Rwanda (Sievers et al., 2008), malaria was found to account for 48.6% of the 551 suspected admissions in a district hospital while the absolute number of malaria decreased following intervention; from the Makamba district of Burundi (Gerstl et al., 2009), malaria was found to account for fever in 47.2% of the 195 children surveyed and 31.4% among children who had a positive history of recent fever. Malaria was also found to account for 87.4% of the total 7,621 treated for various ailments in Burkina Faso (Tiono et al., 2008); this was against the 34.1% recorded in the control area. Findings from Tanzania (Mboera et al., 2008) showed a malaria prevalence of 21.0% among children who were not sleeping under insecticide treated bed nets (ITNs); and from Maiduguri Nigeria (Kagu et al., 2007), the prevalence of malaria from among ante-natal women was found to be 22.1%. Statistics about malaria from populations in Uganda (Mbonye et al., 2006), Cameroon (Nkuo et al, 2005), and Malawi (Chibwana et al., 2009) are generally high and much similar.

It was on 25th of April 2000 that African heads of state and government assembled in Abuja, Nigeria's capital city to renew their commitment towards a UN backed initiative tagged "Roll Back Malaria" (RBM) (Nabarro et al, 1998; Shiff, 2002; and Africa Summit, 2000). Some of the control measures adopted at the convention among others were: Provision of insecticide treated bed nets (ITNs), Stepping up advocacy and public enlightenment, Provision of more potent antimalarial drugs for treatment and prophylaxis, and provision of kits for rapid malaria diagnosis (Wang et al., 2006; and Zurovac et al., 2008).

Nine years have so far have passed in the first instance of the original time table set by the continent to halve malaria by the year 2010. With less than a year to the 10th anniversary of RBM and the end of malaria decade in Africa, there is need to assess the present impact of the disease among African pregnant women who are usually among those worst hit by the disease (Nabarro et al, 1998; Shiff, 2002; and Africa Summit, 2000). This forms

the basis for the present study.

MATERIALS AND METHODS

Study Area

The study was carried out in Otukpo, a semi-urban community in Benue state of north-central Nigeria. It is located in the Savannah zone between latitude 7, 20 N and longitude 8, 12 W, and Latitude 7,30S and longitude 8,20E with annual rainfalls of about 1650mm from April to October.

Sample collection and Procedure

Pregnant women attending ante-natal clinic at General hospital Otukpo between March and August 2009 were recruited for the study. All the willing subjects were recruited into the study; structured questionnaires were administered to the respondents and information such as: age, occupation, marital status, number of previous pregnancies, number of children, mosquito control methods and educational levels were obtained. Capillary blood samples were obtained with the aid of sterile lancet where thick and thin blood films on a clean glass slide were made (Kagu et al., 2007). These were stained using Giemsa's staining method, air dried and examined microscopically using X100 oil immersion objective to view malaria parasites. Heparinized haematocrit tubes were used to collect capillary blood, sealed using a Bunsen burner flame and centrifuged at 3000 rpm for 5 minutes in a haematocrit machine where packed cell volume (PCV) was measured to ascertain or otherwise, the presence of anaemia ($PCV < 28\%$)¹². The results of women who were anaemic and or had malaria parasites were compiled and submitted at the ante-natal clinic for appropriate treatments and follow up.

Ethical Considerations

Ethical approval for the study was obtained from the ethical committee of the Benue state ministry of Health while informed oral consent was obtained from each participant.

Analysis of Results

Data obtained was analysed using Epi Info 6 statistical software while ANOVA was used to compare multiple variants, $P \leq 0.05$ was considered significant.

RESULTS

Of the 726 ante-natal women studied with age range 16-46 years, the mean age was 28 with a bimodal age of 24 and 31. Those aged 10-19 years were 3.4% (n= 25); 20-29, 71.8% (n=571); 30-39, 24.2% (n=176); and 40-49, 0.6% (n=4). Those who presented with their first pregnancy were 17.6% (n=128); second, 44.2% (n=321), third, 33.5% (n=234), and above three, 4.7% (n=34) (Table 1).

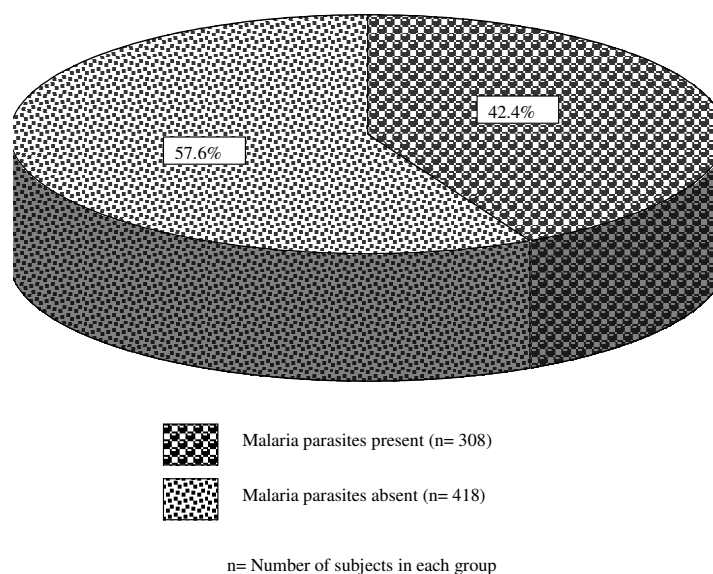
The incidence of malaria parasitaemia among the ante-natal women was 42.4% (308/726) while 71.6% (221/308) of them were anaemic ($PCV < 28\%$) (Figure 1).

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Table 1. Age distribution and Total number of pregnancies among ante-natal women in Otukpo, north-central Nigeria.

Age (Years)	1 (%)	2 (%)	3 (%)	> 3 (%)	Total (%)
10-19	23(3.1)	2(0.3)	0(0.0)	0(0.0)	25(3.4)
20-29	87(12.0)	283(39.0)	146(20.1)	5(0.7)	521(71.8)
30-39	18(2.5)	35(4.8)	95(13.1)	28(3.8)	176(24.2)
40-49	0(0.0)	1(0.1)	2(0.3)	1(0.1)	4(0.6)
Total	128(17.6)	321(44.2)	243(33.5)	34(4.7)	726(100)

Total Number of Pregnancies

**Figure 1.** Incidence of malaria parasitaemia among ante-natal women in Otukpo, north-central Nigeria

Based on age of pregnancy among the subjects, 41.6% (64/154) of those in their first trimester were infected; 42.3% (178/422), and 45.3% (68/150) of those in their second and third trimesters were also respectively infected, ($P > 0.05$) (Figure 2).

Analysis of incidence of malaria parasitaemia in relation to the number of children by the respondents showed that: 40.3% (163/405), 43.1% (116/270), 55.2% (17/31), and 50.0% (10/20) of those with malaria had respectively, 1-2, 3-4, 5-6, and ≥ 7 children, ($P > 0.05$) (Figure 3).

A review of incidence of malaria parasitaemia and methods of mosquito control with emphasis on use and otherwise, of mosquito nets showed that: 22.7% (165/726) and 32.6% (237/726) used insecticide treated bed nets (ITNs) and untreated bed nets (UTNs) respectively; 29.5% (214/726) used no control measure, and 15.2% (110/726) used other methods (spray insecticide, mosquito coil, local methods). Those who used ITNs and UTNs recorded 22.2% (36/165) and 37.5% (89/237) incidence of malaria parasitaemia respectively; 53.3%

(114/214) and 42.9% (47/110) infection rates were recorded among those with no control method and those who used other control methods {spray insecticides 29.0% (24/83), burn mosquito coil 37.0% (10/28) and local methods 50.0% (21/42) ANOVA 95% CI, $P < 0.001$ } respectively, ($P < 0.001$) (Figure 4).

Based on educational attainment by the respondents; those who attained Nil, Primary, Secondary, and Tertiary educational levels were respectively, 67.9% (253/377), 22.1% (38/172), 8.9% (11/123), and 12.9% (7/54) infected, ($P < 0.001$) (Figure 5).

DISCUSSION

The incidence of malaria parasitaemia among ante-natal women in Otukpo was found to be 42.3% with no significant difference in incidence in the age of pregnancy at presentation ($P > 0.05$). This finding is higher than that of Nwonwu and co-workers in Abakaliki where 29% prevalence was reported among 193 pregnant women

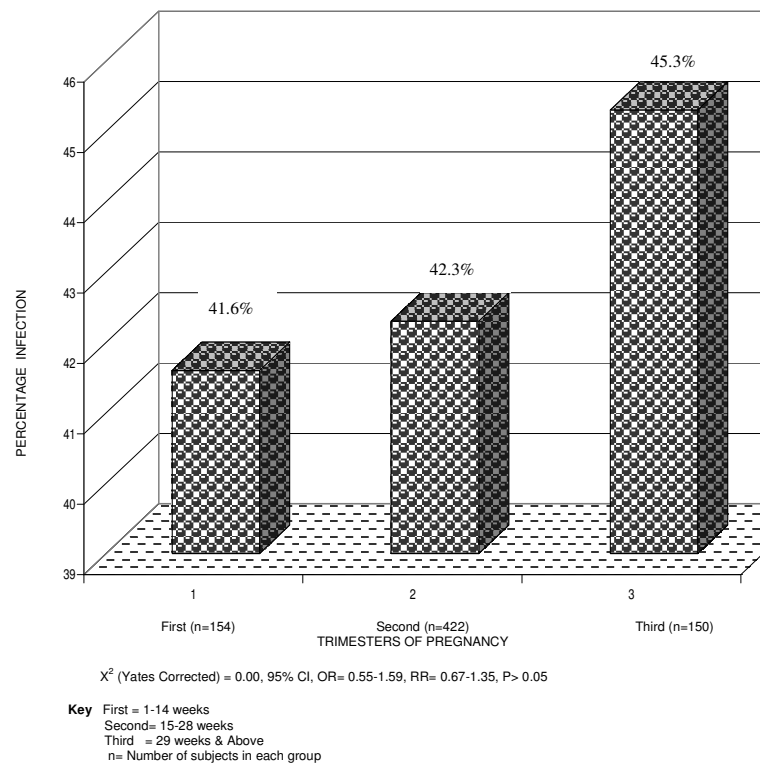


Figure 2. Incidence of malaria parasitaemia in relation to age of pregnancy among ante-natal women in Otukpo, north-central Nigeria.

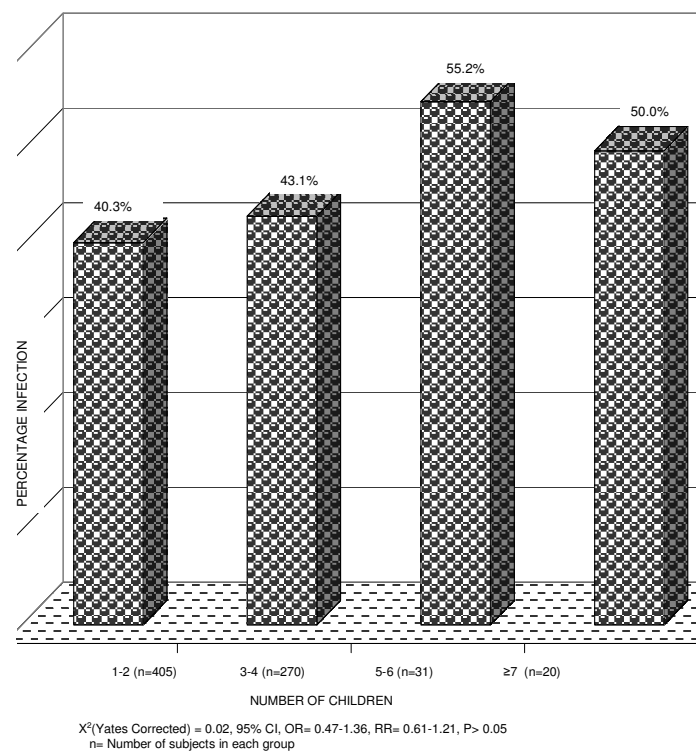


Figure 3. Incidence of malaria parasitaemia in relation to the number of children born by ante-natal women in Otukpo, north-central Nigeria

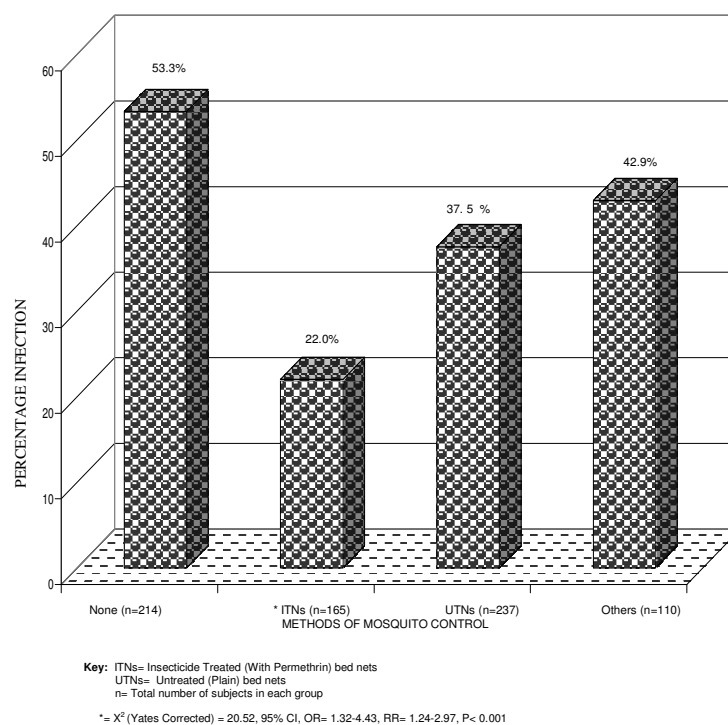


Figure 4. Incidence of malaria parasitaemia in relation to methods of mosquito control among ante-natal women in Otukpo, north-central Nigeria.

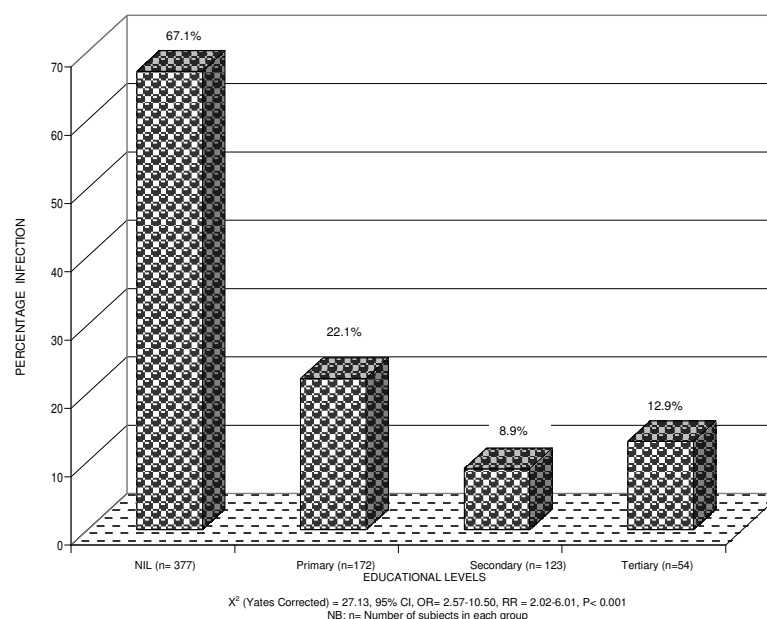


Figure 5. Incidence of malaria parasitaemia in relation to the educational level among ante-natal women in Otukpo, north-central Nigeria

(Nwonwu et al., 2009). Uneke and co-workers, also in Abakaliki reported a much lower figure of 19.7% malaria

prevalence among the same group of people (Uneke et al, 2008); while Kagu et al. in Maiduguri reported 22.1%

malaria prevalence among pregnant women (Kagu et al., 2007). Although, there are no readily available reports on a similar work in the community in the past for favourable comparison; this high rate of malaria among pregnant women in Otukpo presently calls for the need to review the control measures available to the people in the locality with a view to possibly making amends. The maternal morbidity and mortality generally associated with malaria calls for urgent need towards its aggressive control in the community (Lloyd et al., 1988; Tjitra et al., 2008; and Otten et al., 2009).

Anaemia was recorded in 71.6% of the malarial subjects. This finding compares well with that of a similar study in Maiduguri (Kagu et al., 2007) where anaemia was recorded in 72%, but much higher than that of a related study in Abakaliki (Nwonwu et al., 2009) where anaemia was recorded in 17.2% of the expectant mothers. Considering the role anaemia plays in the outcome of pregnancies, a figure as high as 71.6% in the present study among ante-natal women with malaria should be a wake up call towards a more aggressive control of malaria and hence anaemia, dietary factors notwithstanding. This is in view of the fact that malaria associated anaemia has been shown to be directly or indirectly associated with several of the pregnancy related complications in sub-Saharan Africa (Hotez and Kamath 2009).

The ownership and use of ITNs was recorded in 22.7% of the respondents while 32.6% used UTNs. This low use of ITNs could have significantly contributed to the high incidence of malaria recorded in the present study especially where the group that used ITNs and UTNs recorded the lowest incidence of malaria among the subjects ($P < 0.05$). A sizable amount of the USD669.3 million grant from the Global fund to the Nigerian government towards malaria and HIV AIDS control should be devoted to procurement and distribution of ITNs, and the public adequately sensitized on its use (NAN, 2009). The ownership and use of ITNs, a cardinal component of the RBM initiative has similarly been found to be low in other African countries like: Tanzania (Oxborough et al., 2008), Guinea Bissau (Dabire et al., 2008), and Burkina Faso (Beiersmann et al., 2007). In order to guarantee the success of the RBM initiative the supply and distribution of ITNs by African member nations, as a mater of policy, has to be taken more seriously (Sievers et al, 2008).

The fact that the incidence malaria among the ante-natal women studied decreased proportionately with increase in educational level attainment ($P < 0.001$) stresses the role literacy could impact on the overall success of the malaria control programmes in our communities. Government should step up her policies on adult literacy and create more avenues for education of her adult populace so as to reduce the disease burden, not only of malaria, but that of several other tropical and subtropical diseases. With proper education, the use of traditional control methods for malaria, which have not passed the

proof of success, would naturally give way for the modern, tested and more reliable control methods (Falade et al., 2005-2006; Mwenesi et al., 1995; and Nsungwa-Sabiiti et al., 2007).

Conclusion

In conclusion, the present study has shown that malaria is still a major health problem among pregnant women in Otukpo and its environs while patronage and use of ITNs is still low nine years after commencement of RBM initiative. The present control measures available in the community should be re-visited and proper amends made with special emphasis on the supply and distribution of ITNs with adequate sensitization on its use. With proper surveillance of the control measures for efficiency, the community may not, at the end, call it a wasted decade for malaria control in Africa.

REFERENCES

- African Summit on "Roll Back Malaria" (2000). The Abuja declaration on "Roll Back
- Beiersmann C, Sanou A, Wladarsch E, De Allegri M, Kouyaté B, Müller O (2007). Malaria in rural Burkina Faso: local illness concepts, patterns of traditional treatment and influence on health-seeking behaviour. *Malar. J.* 6:106-xxx
- Chibwana AI, Mathanga DP, Chinkhumba J, Campbell CH Jr (2009). Socio-cultural predictors of health-seeking behaviour for febrile under-five children in Mwanza-Neno district, Malawi. *Malar. J.* 8(1): e219.
- Dabire KR, Diabate A, Agostinho F, Alves F, Manga L, Faye O, Baldet T (2008). Distribution of the members of *Anopheles gambiae* and pyrethroid knock down resistance gene (*kdr*) in Guinea Bissau, West Africa. *Bull. Soc. Pathol. Exot.* 101(2):119-123.
- Falade CO, Ogundiran MO, Bolaji MO, Ajayi IO, Akinboye DO, Oladepo O, Adeniyi JD, Oduola AM (2005-2006). The influence of cultural perception of causation, complications, and severity of childhood malaria on determinants of treatment and preventive pathways. *Int. Q. Community Health Educ.* 24(4): 347-363.
- Gerstl S, Cohuet S, Edoh K, Brasher C, Lesage A, Guthmani JP, Checchi F (2009). Community coverage of an antimalarial combination of artesunate and amodiaquine in Makamba province, Burundi, nine months after its introduction. *Malar. J.* 6:e94.
- Hopkins H, Talisuna A, Whitty CJ, Staedke SG (2007). Impact of home-based management of malaria on health outcomes in Africa: a systematic review of the evidence. *Malar. J.* 6: e134.
- Hotez PJ, Kamath A. Neglected tropical diseases in sub-saharan Africa: review of their prevalence, distribution, and disease burden. *PLoS Negl. Trop. Dis.* 2009; 3(8): e412.
- Kagu MB, Kawuwa MB, Gadzama GB (2007). Anaemia in pregnancy: a cross-sectional study of pregnant women in a sahelian tertiary hospital in north-eastern Nigeria. *J. Obstet. Gynaecol.* 27(7): 676-679.
- Lloyd A, Crane G, Rozenberg MC (1988). Long-standing fevers in a young pregnant woman. *Med. J.* 149(7):382-6.
- Malaria" in Africa. By African Heads of state and government , Abuja Nigeria, 25th April 2000. http://www.rbm.who.int/docs/abuja_declaration.pdf Accessed 14th September 2009
- Mboera LEG, Kamugisha ML, Rumisha SF, KisanzaWN, Senkoro KP, Kitua AY (2008). Malaria and mosquito net utilization among school children in villages with or without healthcare facilities at different altitudes in Iringa district Tanzania. *Afri. Health Sci.* 8(2):114-

- 119.
- Mbonye AK, Neema S, Magnussen P (2006). Treatment-seeking practices for malaria in pregnancy among rural women in Mukono district, Uganda. *J. Biosoc. Sci.* 38(2): 221-237.
- Meremikwu MM, Ezedinachi EN, Oyo-Ita AE, Bassey AE, Asiegbo VC (2001). Assessment of ability of Nigerian mothers to recognize anaemia in children with malaria. *Trop. Doct.* 31(1): 40-41.
- Mokuolu OA, Falade CO, Orogade AA, Okafor HU, Adedoyin OT, Oguonu TA (2009). Malaria at parturition in Nigeria: current status and delivery outcome. *Infect. Dis. Obstet. Gynecol.* 2009: e473971.
- Mwenesi HA, Harpham T, Marsh K, Snow RW (1995). Perceptions of symptoms of severe childhood malaria among Mijikenda and Luo residents of coastal Kenya. *J. Biosoc. Sci.* 27(2): 235-244.
- Nabarro DN, Tayler EM (1998). The "Roll Back Malaria" campaign. *Science* 280: 2067-2068.
- Narasimhan V, Attaran A (2003). Roll back malaria? The scarcity of international aid for malaria control. *Malar. J.* 2: e8.
- News Agency of Nigeria (NAN) (2009). Nigeria signs global fund grant worth \$669.3m. *The Nation Newspapers (Nigeria)*, 4(1189): 22. Thursday, October 22.
- Nkuo Akenji TK, Ntonfor NN, Ching JK, Kimbi HK, Ndamukong KN, Anong DN, Boyo MG, Titanji VP (2005). Evaluating a malaria intervention strategy using knowledge, practices and coverage surveys in rural Bolifamba, southwest Cameroon. *Trans. R. Soc. Trop. Med. Hyg.* 99(5): 325-332.
- Nsimba SE, Kayombo EJ (2008). Sociocultural barriers and malaria health care in Tanzania. *Eval. Health Prof.* 31(3):318-322.
- Nsungwa-Sabiiti J, Peterson S, Pariyo G, Ogwal-Okeng J, Petzold MG, Tomson G (2007). Home-based management of fever and malaria treatment practices in Uganda. *Trans. R. Soc. Trop. Med. Hyg.* 101(12):1199-1207.
- Nwonwu EU, Bekwe PC, Ugwu JI, Obarezi HC, Nwagbara OC (2009). Prevalence of malaria parasitaemia and malaria related anaemia among pregnant women in Abakaliki, south-east Nigeria. *Nig. J. Clin. Pract.* 12(2): 182-186.
- Oberländer L, Elverdan B (2000). Malaria in the United Republic of Tanzania: cultural considerations and health-seeking behaviour. *Bull. World Health Organ.* 78(11):1352-1357.
- Otten M, Aregawi M, Were W, Karema C, Medin A, Bekele W, Jima D, Gausi K, Komatsu R, Korenromp E, Low-Beer D, Grabowsky M (2009). Initial evidence of reduction of malaria cases and deaths in Rwanda and Ethiopia due to rapid scale-up of malaria prevention and treatment. *Malar. J.* 8:14.
- Oxborough RM, Mosha FW, Matowo J, Mideme R, Feston E, Hemingway J, Rowland M (2008). Mosquitoes and bed nets: testing the spatial positioning of insecticide on nets and the rationale behind combination insecticide treatments. *Ann. Trop. Med. Parasitol.* 102(8): 17-27.
- Patterson AE, Winch PJ, Gilroy KE, Doumbia S (2006). Local terminology for medicines to treat fever in Bougouni District, Mali: implications for the introduction and evaluation of malaria treatment policies. *Trop. Med. Int. Health.* 11(10):1613-24.
- Shiff C (2002). Integrated Approach to Malaria Control. *Clin. Microbiol. Rev.* 15(2): 278-293.
- Sievers AC, Lewey J, Musafiri P, Franke MF, Bueyiboruta BJ, Stulac SN, Rich ML, Karema C, Daily JP (2008). Reduced paediatric hospitalizations for malaria and febrile illness patterns following implementation of community-based malaria control programme in rural Rwanda. *Malar. J.* 7: e167.
- Tiono AB, Kabore Y, Traore A, Convelbo N, Pagnoni F, Sirima SB (2008). Implementation of home based management of malaria in children reduces the work load for peripheral health facilities in a rural district of Burkina Faso. *Malar. J.* 7:e201.
- Tjitra E, Anstey NM, Sugiarto P, Warikar N, Kenangalem E, Karyana M, Lampah DA, Price RN (2008). Multidrug-Resistant *Plasmodium vivax* Associated with Severe and Fatal Malaria: A Prospective Study in Papua, Indonesia. *PLoS Med.* 5(6): e128.
- Uneke CJ, Ivare FE, Oke P, Duhlińska DD (2008). Assessment of malaria in pregnancy using rapid diagnostic tests and its association with HIV infection and haematologic parameters in south eastern Nigeria. *Haematologica* 93(1): 143-4.
- United Nations (UN) (2000). Africa: 2001-2010- Decade to roll back malaria in developing countries, particularly in Africa. *allAfrica.com*. n <http://www.allafrica.com>. Accessed 14th September 2009.
- Wang SJ, Lengeler C, Smith TA, Vounatsou P, Akogbeto M, Tanner M, Rapid Urban Malaria Appraisal (RUMA) IV (2006). Epidemiology of urban malaria in Cotonou (Benin). *Malar. J.* 5: e45.
- Zurovac D, Larson BA, Skarbinski J, Slutsker L, Snow RW, Hamel MJ (2008). Modeling the Financial and Clinical Implications of Malaria Rapid Diagnostic Tests in the Case-management of Older Children and Adults in Kenya. *Am. J. Trop. Med. Hyg.* 78(6):884-891.