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Assessing the Progress of Malaria Control in Nigeria

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Abstract

One third of the world's malaria deaths occur in Nigeria. It is doubtful whether Nigeria will meet the malaria control target of the Millennium Development Goals by 2015, having failed to meet the Abuja target to halve the burden of malaria by 2010. This paper assesses the current malaria burden and progress toward malaria control. Substantial data were obtained from the 2008 Nigeria Demographic and Health Survey and other secondary sources. Data showed that the malaria burden is still enormous because of inadequate control efforts. In 2008, only 17% of Nigerians owned at least one net, compared with 12% in 2003. Eight percent owned an insecticide-treated mosquito net (ITN), but only 6% of under-five children and 5% of pregnant women slept under an ITN. Only one third of under-five children with fever received antimalarial drugs, while one fifth of pregnant women took antimalarial drugs for prevention. Chloroquine is still the most common drug used in malaria treatment, despite its ban in first-line treatment since 2005. The paper concludes that scaling up home management of malaria and a community-centred approach to ITN and artemisinin-based combination therapy provisioning should be prioritized.

Introduction

Despite some levels of commitment to malaria control, malaria still remains a major public health problem worldwide. Malaria takes the lives of more than one million people annually, 90% of whom live in sub-Sahara Africa (SSA), and it causes 300 to 500 million people to fall ill (Bloland et al. 2000; Nuwaha 2001; Agyepong and Kankeya-Kayonda 2004; Barat et al. 2004; Breman et al. 2004; Moree and Ewart 2004; World Health Organization [WHO] 2005; United Nations Children's Fund [UNICEF] 2007). Malaria is one of the leading causes of morbidity and mortality among the

Nigerian population, especially in under-five children. The World Bank (WB; 2009) reported that up to one third (300,000) of all world malaria deaths occur in Nigeria. Malaria also exacts a heavy socio-economic burden on Nigerian households and health systems (WHO 2008; WB 2009). Due to the burden of disease over many decades, Nigeria had been a signatory at the African Roll Back Malaria (RBM) summit held in Abuja in 2000 (often called Abuja summit), which arrived at the declaration to achieve universal coverage of insecticide-treated mosquito nets (ITNs) and ensure prompt treatment of vulnerable populations (especially under-five children and pregnant women). Unfortunately, the history of malaria control in Nigeria since the summit is one of insufficient effort and funding to achieve the targets. This is why the progress has been too slow.

It is therefore doubtful whether Nigeria will meet the malaria control target of the Millennium Development Goals (MDGs) (to alleviate 80% of the burden of malaria by 2015). As at 2005, one third of children with fever received no antimalarial drugs, less than 20% of households had at least one mosquito net and only 6% of children under-five slept under an ITN (National Malaria Control Program [NMCP] in Nigeria 2005). In most resource-constrained countries like Nigeria, up to 50% of the population has no access to modern healthcare facilities, and this is the reason for the global trend to scale up home management of malaria (Gyapong and Garshong 2008). Nigeria has also adopted home management of malaria and ITN to protect the vulnerable population from malaria.

Apart from the declaration of the MDGs in 2000, the Abuja summit witnessed the launch of ITNs as the major effective preventive device, with the promise to cover all vulnerable groups (especially under-five children and pregnant women) by 2010. All these promises make it imperative to evaluate malaria control performance a decade after the Abuja summit and the declaration of the MDGs. Therefore, the objective of this paper is to assess Nigeria's progress toward malaria control, specifically by looking at the current incidence of malaria and prompt treatment among vulnerable populations.

Methods

The major source of data for this study is the 2008 Nigeria Demographic and Health Survey (NDHS).[1] Other available secondary data were used to complement NDHS data. The fourth NDHS was conducted in 2008 as a national representative survey of 33,385 women aged 15 to 49 years and 15,486 men aged 15 to 59 years. Household size was 4.4 persons in 2008, as against 5.0 in 2003. The sample had 11,027 women with a live birth in the two years preceding the survey and 24,975 under-five children. The 2008 NDHS sample was selected using a stratified two-stage cluster design consisting of 888 clusters, 286 in urban and 602 in rural areas. A representative sample of 36,800 households was selected for the 2008 NDHS survey, with a minimum target of 950 completed interviews per state (of the 36 states and Federal Capital Territory). During the fieldwork, only 34,644 households were occupied, out of which 34,070 were interviewed, which represents a 98% response rate. A complete listing of households was made and a mapping exercise was carried out for each cluster, with the resulting lists of households serving as the sampling frame. In the second stage of selection, an average of 41 households were selected in each cluster, using probability systematic sampling. The 2008 NDHS utilized a questionnaire to collect data on malaria and other health- and population-related issues from respondents. This study extracted information on groups vulnerable to malaria, especially on the use of nets, prompt treatment and intermittent preventive treatment during pregnancy (IPTp), and the coverage of malaria prevention programs. All households in the 2008 NDHS were asked whether they owned a mosquito net especially for the protection of pregnant women and under-five children. Use of sulfadoxine-pyrimethamine (SP) for prevention of malaria during pregnancy was also surveyed. The survey also asked questions regarding access to prompt treatment for under-five children with fever.

Data were presented and analyzed using quantitative methods. This study collated data from the 2008 NDHS and other secondary sources to make inferences on the state of malaria control efforts in order to determine the progress toward elimination of the malaria burden in Nigeria. Secondary data were analyzed and discussed.

Results

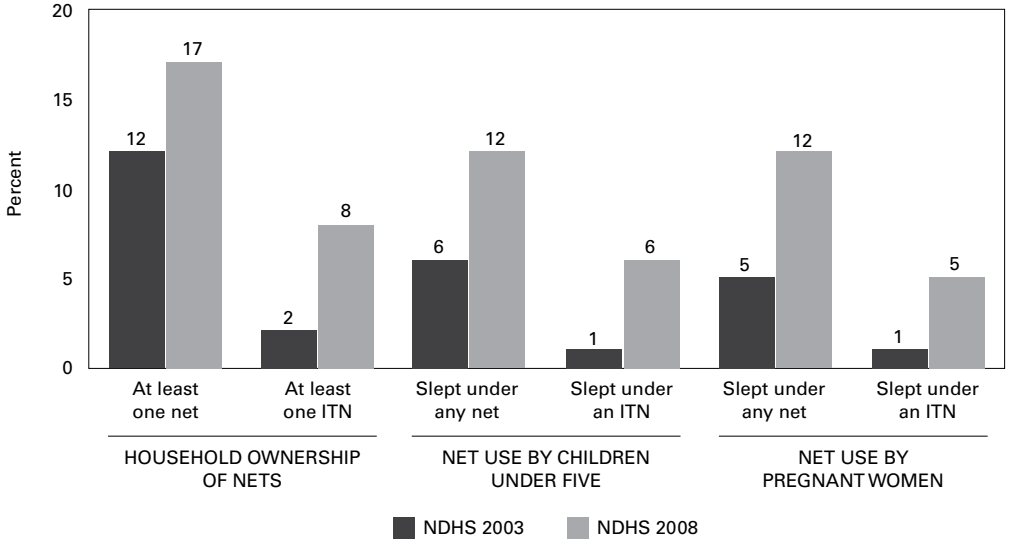
Incidence of Malaria

The projected population of Nigeria as at 2010 is 158.9 million (RBM 2010), with a national growth rate estimated at 3.2% per annum (National Population Commission [NPC] 2006); hence, Nigeria is the most populous nation in Africa. The burden of malaria is worrisome in Nigeria as it accounts for the highest number of malaria cases in the WHO African Region (WHO 2008a). Transmission occurs in the south throughout the year but is more seasonal in the north. Almost all cases are caused by *Plasmodium falciparum* – the deadliest of the four malaria parasites. Results of the 2005 national malaria survey showed four major critical points: (1) one third of children with fever received no antimalarial drugs, (2) about 20% of households had at least one mosquito net, (3) about 7% of pregnant women slept under an ITN, and (4) about 6% of under-five children slept under an ITN (NMCP 2005). Over the years, there have been no significant improvements, as the pernicious burden of malaria is still very high. In 2006, the WHO estimated about 57.5 million malaria cases and 225,000 deaths from malaria in Nigeria, with more than 97% of mortality occurring among under-five children (WHO 2008). The upsurge in cases is due to an increasing rate of reported malaria over the years.

Nigeria bears the greatest burden of malaria in the world. Malaria contributes to infant and under-five mortality, which now stand at 75 deaths per 1000 live births and 157 per 1000 live births, respectively, (NPC and ICF Macro 2009). Almost half of childhood deaths occur during infancy, with one quarter taking place during the first month of life. NDHS 2008 estimated that:

1. Malaria is responsible for 25% and 30% of total infant and child mortality, respectively
2. Over 110 million clinically diagnosed malaria cases are recorded annually,
3. Malaria accounts for 60% of outpatient visits,
4. It is also responsible for 30% of hospitalizations,
5. 11% of maternal mortality is due to malaria, and
6. 300,000 children die yearly due to malaria in Nigeria alone (NCP and ICF Macro 2009).

Figure 1. Trends in net ownership and use in Nigeria.



Source: National Population Commission and ICF Macro 2009: 192.
ITN = insecticide-treated net; NDHS = Nigeria Demographic and Health Survey

The malaria burden highlighted in the 2008 NDHS is similar to the report of Federal Republic of Nigeria (FRN) in 2007. Malaria also slows economic growth due to high treatment and preventive costs, and lost work hours and productivity. Funds that would have been used for development projects are usually diverted to malaria control. In short, malaria is the greatest public health challenge in Nigeria.

Current Level of Prevention and Control of Malaria

There have not been significant improvements in the use of ITNs in Nigeria. Figure 1 shows the use of mosquito nets in Nigeria. It is severally reported that millions of ITNs have been distributed annually since the Abuja summit. Only 17% of Nigerians owned at least one net (but not necessarily an insecticide-treated one) in 2008, compared with 12% in 2003. While 8% of surveyed households owned an ITN, only 6% of under-five children slept under one (NPC and ICF Macro 2009). This represents an improvement of five percentage points from 1% in 2003. Among pregnant women, 5% slept under an ITN in 2008. All this shows a considerably low performance in scaling up ITN usage in Nigeria. It can therefore be observed that mosquito net usage is low among young children and pregnant women.

As well as from ITN usage, prompt treatment is poor among most vulnerable groups. Table 1 presents findings about prevalence and prompt treatment of fever/convulsions among under-five children. NDHS 2008 reported that of the 15.9% of under-five children with fever in the two weeks preceding the survey, only 33.2% received antimalarial drugs. The use of artemisinin-based combination therapy (ACT) is still very low. ACT usage is 2% in urban areas compared with 1% in rural areas. The surveys indicated that chloroquine (CQ) is still the most common drug used in malaria treatment in Nigeria, despite the fact that malaria parasite resistance to CQ is widespread. This accounts for the high rate of treatment failure and subsequent increase in under-five mortality rate. Among under-fives with fever, only 15.2% received antimalarial drugs the same or next day. This signifies delay in treatment, as mothers may wait between two and four days before starting any form of treatment.

Mother's level of education played a significant role in administration of antimalarial drugs. Table 1 shows that the percentage of children with fever was lowest among those whose mothers had more than secondary education. Women with secondary education and above were twice as likely to administer antimalarial drugs as their counterparts with less education. Also, 2008 NDHS also showed that the percentage of children with fever was lower in households in the highest wealth quintile, coupled with a greater propensity to administer antimalarial drugs, than those from lower wealth quintiles.

NDHS 2008 further reported that among women who had their last birth in the two years before the survey, 18% took an antimalarial drug during pregnancy: 11% of all pregnant women took at least one dose of an SP drug, while 7% took two or more doses. Only 8% of the women participated in IPTp as part of antenatal care. IPTp usage shows no improvement from he 20% reported in NDHS 2003.

At the level of control activities, Nigeria has adopted a number of malaria control strategies. Home management of malaria (HMM) was adopted in 2005 as part of control strategies. Other strategies include (1) free distribution of long-lasting insecticide-treated nets (LLINs) among under-five children and pregnant women since 2001, (2) free distribution of LLINs extended to all age groups in 2009, (3) indoor residual spraying for prevention and control of epidemics since 2007, (4) intermittent preventive treatment with the use of SP for prevention of malaria during pregnancy since 2001, and (5) free ACT for under-five children and highly subsidized ACT for other age groups in the public sector since 2006. Oral monotherapies banned in first-line treatment since 2005 and rapid diagnostic tools (RDTs) have been used in areas without microscopy since 2006.

Unfortunately, the strategies have not been effective enough to yield deserving results. From 2005 to 2007, the National Malaria Control Program distributed over 11.5 million LLINs and 7.3 million ITNs, but this could only cover 5% of the at-risk population (WHO 2008, 2009). It is further observed that 8 million courses of ACTs delivered in 2006, 9 million in 2007 and 12 million in

2008 are far below total requirements. There have not been dedicated efforts in scaling up HMM.

Table 1. Prevalence and prompt treatment of fever/convulsions

Percentage of children under age five with fever in the 2 weeks preceding the survey, and among children with fever, the percentage who received antimalarial drugs and the percentage who received the drugs the same or next day following the onset of fever, by background characteristics, Nigeria 2008					
	Under-five children		Under-five children with fever		
Background characteristics	Percentage with fever in the 2 weeks preceding the survey	Number of children	Percentage who took antimalarial drugs	Percentage who took antimalarial drugs same or next day	Number of children
Age (in Months)					
<12	14.3	5729	32.3	14.9	820
12–23	21.3	4945	31.4	13.7	1054
24–35	17.8	4633	34.8	16.0	826
36–47	13.7	5013	32.6	14.0	688
48–59	12.4	4653	36.0	18.3	579
Residence					
Rural	12.8	7690	41.1	19.1	987
Urban	17.2	17,284	30.5	13.8	2981
Region					
North central	9.6	3434	47.3	21.1	331
North east	21.9	3989	21.8	11.5	872
North west	15.7	7594	29.2	12.9	1189
South east	22.9	2428	21.5	10.4	555
South south	20.6	3310	47.1	21.1	682
South west	8.1	4221	53.6	22.3	340
Mother's education					
No education	16.3	11,342	25.8	11.2	1846
Primary	15.4	5805	31.1	15.5	893
Secondary	16.0	6385	44.9	20.8	1022
More than secondary	14.4	1441	50.0	21.1	207
Total	**15.9**	**24,975**	**33.2**	**15.2**	**3968**

Source: National Population Commission and ICF Macro 2009: 195.

Considering the targets to be met by 2010 and 2015, Nigeria has fared poorly in malaria control, especially from 2000 to 2009. There has been a rush toward meeting the RBM target by 2010.

Table 2 presents expected intervention needs (presented in the second column), actual needs already covered and most deliveries that were to be made between September 2009 and December 2010.

Table 2 shows that 62.9 million (m) LLINs, calculated at two per five-person household, were needed between 2009 and 2010. Therefore, over 40 m LLINs, 94 m ACT doses and 34 m RDTs were supposed to be delivered and distributed in 2010. These supplies are 10 times greater than those delivered since the declaration of the targets in 2000. It is evident that even if the 2010 deliveries were made, their effective distribution to meet the RBM 2010 target within a few months was unrealistic. This is partly because problems of community mobilization and other community issues (such as local understanding of malaria, awareness of ITNs, community acceptability and delay in seeking treatment) still need to be addressed before such deliveries can translate to alleviation of the malaria burden. Apart from community issues, Table 2 also indicates gaps that would not be covered – 35 m courses of ACT and 29 m of RDTs. It is therefore obvious that funding shortfalls and a sapped political will over the years have stymied progress in malaria control, culminating in the uphill struggle at the eleventh hour to meet the targets. These prevailing shortcomings have been responsible for the failure to reach targets; hence, the enormous burden of malaria still persists.

Table 2. Nigeria: Roadmap to achieve 2010 RBM targets, September 2009 to December 2010

Intervention	Need to 2010	Already covered	Funded and expected to be distributed before end 2010	Gap
Long-lasting insecticide-treated nets (LLINs)	62.9 m LLINs: (22.3 m from Sept. 2009; 40.5 m in 2010 @ 2 LLINs /HH with 5 persons/HH + wastage)	4.4 m	49.378 m	9.2 m
Artemisinin-based combination therapy	129,194,824 doses: Sept, 2009: 28,175,491; 2010: 101,019,333 (80% coverage)	8.3 m	94,267,437	34,927,387
Indoor residual spraying	2,540,843 HHs – 2009: 280,000; 2010: 2,260,843		840,000 280,000 (2009) 560,000 (2010)	4.24 m
Rapid diagnostic tools	59, 202,251 tests – 2009: 29,135,153 tests (30% coverage); 2010: 30,067,098 tests	0	34,353,875 m	28,848,376
Intermittent preventive treatment during pregnancy	18.3 m doses Sept. to Dec. 2009: 2,340,830; 2010: 16 m		18.3 m	0
Population at risk: (projected) (158.9 m in 2010)				

Source: Roll Back Malaria 2010.
HH = household.

Discussion

Nigeria has specific malaria control goals. The major impediment to achieving them has always been frail or insubstantial action-oriented exertions. It is evident that the Abuja target (to halve the burden of malaria by 2010) has not been realized. In Nigeria, over a million children die each year from preventable diseases including malaria (Ngowu et al. 2008). Although funding for malaria control increased from $17 million (US) in 2005 to $80 million in 2008 (WHO 2009), the amount is unlikely to be sufficient to reach national targets for prevention and cure. Evidently, in Nigeria, there is no evidence of a systematic decline in malaria burden (WHO 2008, 2009).

Poverty exacts an influence on the prevalence of malaria (Yusuf et al. 2010), and malaria is in

part a cause of household poverty in SSA, as a poor household may spend up to 25% of its income in the prevention and treatment of malaria (WHO 2000). The household economies of most parts of SSA are not improving, yet there is an inevitable replacement of cheap CQ with a more expensive artemisinin-based combination therapy (ACT) (Amzat and Omololu 2009). The introduction of ACT further increases expenditures on malaria control, though the new drug invariably holds promise for malaria treatment in Nigeria and other endemic countries. The challenge of how to scale up the coverage of ACT is enormous. The Nigerian government banned the use of CQ in first-line treatment of malaria in 2005 (Gbenoba and Atolagbe 2005), yet problems of availability, affordability and adherence to effective ACT are still major challenges to malaria control in Nigeria. Up to 58% of pregnant women receive antenatal care, yet only one fifth of all pregnant women use IPTp (NPC and ICF Macro 2009). This shows that hospital-based IPTp is not effective. The program does not reach most rural communities (where over 60% of the population resides) because an urban implementation bias. These rural communities do not have appropriate health facilities and, hence, are cut off from health program coverage (Amzat 2010). This is part of the reasons why awareness of the new ACT and adoption of ITN are drastically low.

The local population continues to use CQ, despite resistance having been established. CQ use is responsible for the high rate of treatment failure, which has been implicated in the rise of malaria-related morbidity and mortality (Amzat 2009; WHO 2010). Continued CQ use has contributed to the lack of improvement in malaria control efforts, especially among under-five children. Like 2008 NDHS, a study by Adedotun and colleagues (2010) also indicates that only a small proportion of children (13.7%) and adults (5.3%) received prompt treatment in Nigeria. (A low level of access to effective treatment contributes to the high mortality rate among under-five children.)

Afolabi et al. (2009) also found low levels of ITN usage in Nigeria. Onwujekwe et al. (2005) reported that more than 80% of respondents had never purchased any form of ITN. While overall bed net possession was low, Yusuf et al (2010) reported less fever in households with an ITN (Yusuf et al. 2010). Jegede et al. (2006) revealed low levels of awareness of ITNs in Nigeria. ITNs are not widely available, despite claims that several million have been distributed. Most free ITNs are diverted to the market for sale, where vulnerable populations such as the poor cannot afford them. While there is significant improvement in ITN usage in Togo, Guinea-Bissau and Zambia, Nigeria is still trailing, as are Ghana, Senegal and Rwanda (UNICEF 2007). Nigeria accounts for 22.2 million (25%) of all African children (89.6 million) living under conditions of stable malaria transmission who were not protected by an ITN in 2007 (Noor et al. 2009).

Low levels of ITN ownership and access to malaria treatment are reflections of the poor public health system for implementation as well as inadequate political commitment. At the grassroots level, there is poor community mobilization. Many people still hold misconceptions about malaria (Afolabi et al. 2004; Brieger at al. 2001; Jegede et al. 2005; Oguonu et al. 2005; Opiyo et al. 2007; Simsek and Kurcer 2005). Brieger et al. (2001) reported beliefs that malaria in the dry season is attributed to intense heat or 'working in the sun,' while malaria in the rainy season is associated with 'stagnant water,' alcohol, too much fat, too much thinking and increased swampy areas. Such causal attributions represent misconceptions that discourage the use of appropriate preventive and curative measures among the local population. Such misconceptions are as a result of low literacy levels and grossly inadequate education programs. Also, many people resort to self-treatment because of the shortage of health facilities. Most primary health centres do not have adequate number of trained staff (Amzat 2010). Moreover, despite several summits on malaria, and pledged commitments, control programs instituted in Nigeria are deficient, ineffective and devoid of strong political will. For instance, a majority of the local population have no free access to ITNs as they are being sold at $6 to $10 (US) in pharmacies. This is a country where up to 60% of people live below the poverty line of $1 a day (FRN 2007), and less than 5% are covered by the national health insurance scheme (Amzat 2010).

The NDHS also indicated that most mothers have leftover CQ at home for treatment of under-five children. Invariably, most Nigerians still engage in self-treatment and HMM. So there is a need

to scale up HMM in Nigeria to ensure appropriate treatment and referral of severe cases. Amzat and Omololu (2009) claimed that malaria control measures need to be incorporated at the community level in order to reduce malaria-related morbidity and mortality and as one effective way to bring treatment close to the people. This would involve training and engaging volunteers and community health workers (CHWs). Evidence from Burkina-Faso shows that caregivers provided most of the medicines as home treatment, and half of the children received some type of modern treatment within 24 hours of occurrence of first symptoms (Tipke et al. 2009). Nigeria can greatly benefit from training CHWs and other volunteers in malaria treatment, especially at the home level. Training drug vendors and other volunteers as a means of communication in the community is feasible and should be part of control strategies aimed at improving prompt and effective home treatment of malaria, with referral of severe cases (Chuma et al. 2009; Hawkes et al. 2009; Mukanga et al. 2010; Ogutu et al. 2010; Okeke and Uzochukwu 2009; Wakabi 2010; Yasuoka et al. 2010).

Conclusion

Nigeria is trailing far behind in malaria control. The country has not achieved the Abuja target to halve the burden of malaria by 2010. It is also evident that the MDG target to shift the considerable burden of malaria by 80% might not be attained. Committed and gradual activities spread over time will strengthen malaria control, rather than engaging in an eleventh-hour rush that might be wasteful. There is a need to make considerable efforts to improve malaria management. In a resource-constrained nation, scaling-up HMM will complement case management in health facilities. A community-centred approach in ITN and ACT provisioning will be effective in malaria control. Promoting ITN usage by increasing awareness and availability to ensure wide coverage is a critical measure in malaria control. As in Tanzania (Widmar 2009), Nigeria needs to address community-specific practices and attitudes prior to ITN distribution to promote consistent and correct use and change of attitudes toward bed nets as a preventative health measure. The government needs strong political will and action-oriented policies backed with financial support in the fight against malaria. This will go a long way toward achieving the malaria targets of MDGs by 2015.

Endnote

[1] 2008 NDHS is herein cited as National Population Commission (NPC) and ICF Macro 2009.

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