

# Free treatment, rapid malaria diagnostic tests and malaria village workers can hasten progress toward achieving the malaria related millennium development goals: the Médecins Sans Frontières experience from Chad, Sierra-Leone and Mali

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## Abstract

Halving the burden of malaria by 2015 and ensuring that 80% of people with malaria receive treatment is among the health related targets of the Millennium Development Goals (MDGs). Despite political momentum toward achieving this target, progress is slow and many with malaria (particularly in poor and rural communities in Africa) are still without access to effective treatment. Finding ways to improve access to anti-malarial treatment in Africa is essential to achieve the malaria related and other MDG targets. During its work in Chad, Sierra Leone and Mali in the period 2004 to 2008, Médecins Sans Frontières showed that it was possible to significantly improve access to effective malaria treatment through: i) the removal of health centre level user fees for essential healthcare for vulnerable population groups, ii) the introduction of free community based treatment for children using malaria village workers to diagnose and treat simple malaria in communities where geographical and financial barriers limited access to effective malaria care, iii) the improved diagnosis and treatment of malaria using rapid diagnosis tests and artemisinin based combination therapy, at both health facilities and in the community. This paper describes and discusses these strategies and their related impact.

## Introduction

Each year there are an estimated 300 mil-

lion malaria cases and one million malaria attributable deaths, predominantly among young children and pregnant women in rural and poor households in sub-Saharan Africa.<sup>1-4</sup> The Millennium Development Goals (MDGs) of the United Nations have set a target of halving the burden of malaria by 2015 and ensuring that 80% of people with malaria receive treatment.<sup>5</sup> This, along with other international initiatives such as Roll Back Malaria,<sup>6</sup> has led to increased political commitment and funding for malaria control, together with the international promotion of effective interventions (including long lasting, impregnated bed nets and artemisinin based combination therapy (ACT)). Despite these efforts, many people with malaria (particularly in Africa) are still without access to effective treatment. Many patients with suspected malaria do not seek early treatment at healthcare facilities owing to financial barriers (and the perception of their existence) and geographical barriers to access.<sup>7-11</sup> Improving access to effective anti-malarial treatment in Africa by removing such barriers is essential for achieving the MDG targets related to both malaria and maternal and child health.

Between 2004 and 2008, Médecins Sans Frontières (MSF) worked in rural areas of Chad, Sierra Leone and Mali providing care and treatment for malaria, the leading cause of death in these settings.<sup>10,11</sup> MSF showed that it was possible to significantly increase access to malaria treatment through: i) the provision of full, free healthcare for vulnerable groups, ii) free-of-charge community based treatment using village malaria workers, and iii) the effective diagnosis and treatment of malaria with malaria rapid diagnostic tests (RDTs) and ACTs. In this paper, we describe and discuss the impact of these strategies to improve access to malaria treatment in three sub-Saharan African settings.

## Materials and Methods

### Study settings and populations

The study settings were rural areas served by MSF supported health centres in Chad, Sierra Leone and Mali. MSF had established healthcare projects in all of the settings prior to the studies, providing mainly primary and secondary healthcare support. In all three settings, poverty was widespread and health indicators very poor with the majority of households living below the extreme poverty threshold of 1 USD (\$)/person/day.<sup>10</sup> The leading cause of death in all study areas was reported to be malaria or unexplained fever.<sup>10</sup> Patients attending the health centres were seen by government healthcare workers supported by MSF in terms of supplementation of

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Ethical clearance: the MSF projects in Sierra Leone, Chad and Mali function under the framework of formal collaborative agreements with each of the different National Ministries of Health. The activities were conducted within the framework of existing Ministry of Health facilities. The data pertaining to this study did not include patient identifiers and constituted what was routinely collected as part of programme evaluation in each of the project settings, with local and national health authority approval.

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## their remuneration, supervision and training. Médecins Sans Frontières strategies to improve access to effective malaria treatment

Complete or partial removal of financial barriers to malaria treatment at health centre level

Partial removal of financial barriers (experience in Chad<sup>12</sup> and Mali<sup>13</sup>)

Chad. In 2004 in Bongor, Chad, subsidised

ACT was introduced at 18 health centres, serving a target population of 280,000 people. ACT was subsidised up to the price of the former first-line anti-malarial drug – chloroquine.

*Mali.* In 2005, in Kangaba, Mali, RDTs and ACT were provided free-of-charge to children under five years old and at a subsidised rate of 0.17\$ for all other persons at seven health centres serving a population of 66,500 people. Consultations and treatment fees for other diseases continued as in other Ministry of Health facilities.

#### Complete removal of financial barriers (Mali and Sierra-Leone)

*Mali.* In Kangaba, Mali, the introduction of subsidised ACTs in 2004 (phase I of the intervention) was replaced in December 2006 with free care for both children under five years old with any disease and for pregnant women with any case of fever (phase II). A low flat-fee was implemented for all other patients presenting with fever.

*Sierra Leone.* In Bo, Sierra-Leone, free care was implemented at the end of 2004 in five health centres (target population: 142, 273 people) by MSF fully subsidising the previous low flat-fee of 0.12\$.

#### Community based free malaria treatment for the most at-risk through malaria village workers (experience from Chad and Mali)<sup>11</sup>

*Chad.* In Bongor, Chad, in 2005, MSF trained malaria village workers (MVWs) to diagnose and treat malaria in communities living more than five kilometres from the health centres, during the rainy season. They offered care and treatment specifically to children younger than 15 years old with confirmed malaria, providing this free of charge.

*Mali.* In Kangaba, Mali, many villages are a considerable distance from health centres and are often completely cut-off during the rainy season. MSF thus trained MVWs to perform RDTs and, when positive, to provide free treatment for simple malaria in children younger than 10 years old in these communities, during the malaria season.

#### Improving the diagnosis and treatment of malaria

In all three study settings, malaria was diagnosed using the HRP-2 based RDT (Paracheck®, Orchid Biomedical Systems, Goa, India). Cases of uncomplicated malaria were treated with ACT, using a combination of artesunate and amodiaquine. Local health centre staff and MVWs were trained in the use of RDTs and ACTs.

#### Data collection

Routine health centre data, in conjunction with population surveillance data, and mortality surveys were used to measure health centre

utilisation rates and mortality. Surveys were also used to ascertain the main barriers to healthcare access.

## Results

### Complete or partial removal of financial barriers to malaria treatment at health centre level

#### Partial removal of financial barriers

*Chad.* Several months after introducing subsidies on ACT in Bongor, overall attendance rates at these health centres remained low at 0.3 visits/inhabitant/year (compared to the World Health Organisation [WHO] reference rate of 0.6 in rural areas) and only 35% of patients with malaria were estimated to be accessing complete ACT treatment.<sup>10</sup> Geographical barriers may have partly contributed to this but surveys confirmed that financial barriers contributed considerably.<sup>12</sup> Ninety-one per cent of the population in Bongor live on less than 1\$/day (average income: 0.5\$/day) and the cost of one episode of malaria treatment (excluding other indirect costs of accessing care) was equivalent to about ten days of average income per person.

*Mali.* Malaria cases treated at the health centres increased from 0.08 cases/inhabitant/year in 2004 (before the MSF intervention) to 0.1 in 2005 and 0.12 in 2006 following the MSF intervention (Chi-square  $\chi^2=92.36$ ,  $P<0.001$ ). For children under five years of age, treated malaria cases increased from 0.18 in 2004 to 0.25 in 2005 and 0.38 cases/child/year in 2006 ( $\chi^2=474.36$ ,  $P<0.001$ ).<sup>13</sup> However, actual coverage of malaria needs remained very low compared to the expected number of malaria cases (one or two episodes/person/year, depending on the age group).<sup>14</sup>

In summary, full or partial subsidisation of costs related only to malaria care had limited impact on the rate of utilisation of existing services for effective malaria treatment.

#### Complete removal of financial barriers

*Mali.* In comparison to the first phase of the MSF project (free RDTs and ACT for children under five years old and subsidised for all other persons), the introduction of free care for children under five years of age and for pregnant women with fever led to significantly more pregnant women being treated for fever (0.31-1.17 cases/inhabitant/year) and a 3.5-fold increase in the number of children under five years old being treated for confirmed malaria (0.38-1.28 cases/inhabitant/year). The latter represented 64% coverage of total needs compared with less than 20% coverage in phase I of the project (Figure 1). Similarly, five

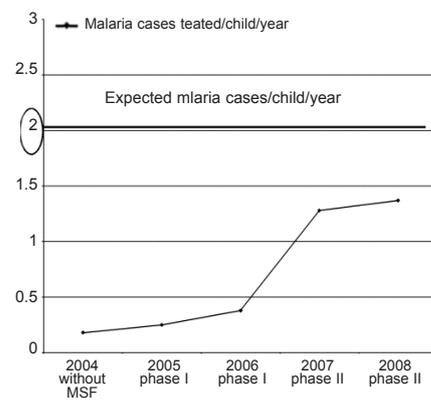


Figure 1. Health centre utilisation (per child per year) for malaria treatment among children under five years of age before and after the removal of user-fees in the Kangaba Circle, Mali.

times more pregnant women were treated for malaria (0.09-0.45 cases/inhabitant/year). Finally, across the health centres, the malaria fatality rate fell from 0.35% in 2006 to 0.03% in 2007 ( $\chi^2=197.23$ ,  $P<0.001$ ).<sup>13</sup> In a control area in the same region (served by health centres charging user fees for all healthcare services), there was little variation in health centre utilisation rates between 2004 and 2007, indicating that the changes observed with MSF were unlikely owing to environmental factors.

*Sierra Leone.* After the introduction of free care for all, there was nearly a two-fold increase in the number of malaria cases (all age groups) diagnosed and treated between 2004 and 2005 (0.4-0.7 cases/inhabitant/year). There was also a marked decrease in overall mortality in the MSF catchment area between 2005 and 2007, from 1.7 (95% CI: 1.4-2.0) to 0.7 (95% CI: 0.6-0.9) deaths/10,000 people/day.<sup>11</sup> For children under five years of age, mortality rates decreased even more dramatically over the same period from 3.5 (95% CI: 2.6-4.4) to 1.3/10,000 people/day (95% CI: 0.9-1.7).

In summary, providing care and treatment free-of-charge for all elements of care for all patients contributed to a significantly increased rate of utilisation of malaria treatment and reduced mortality at population level.

### Community based free malaria treatment through malaria village workers

*Chad.* Compared to the situation seen at the health centres where payment was required, there was a significant increase in the number of patients diagnosed and treated for malaria at the community level (where free malaria care was delivered by the MVWs) with the number of confirmed malaria cases treated increasing from 13,268 in 2004 to 90,294 in 2005 (Figure 2).

*Mali.* The use of MVWs to diagnose and treat simple malaria resulted in the treatment of 7,159 cases of simple malaria during 2007, in villages that would otherwise not have been able to access malaria care and treatment from health centres owing mainly to geographical barriers.

In summary, the delivery of free community based malaria treatment clearly alleviated both the financial and geographical barriers associated with accessing malarial care.

### Improving the diagnosis and treatment of malaria

The routine use of RDTs to confirm a clinical diagnosis of malaria showed that malaria is often over-diagnosed. In Bo, Sierra Leone between 2004 and 2006, one in four of the 315,383 RDTs performed for suspected malaria cases were negative. Similarly, between 2005 and 2007 in Bongor, Chad, almost 160,000 (40%) of 393,239 RDTs performed for suspected malaria cases were negative (Table 1). Thus, in the absence of RDTs, four out of ten cases of fever would have been misdiagnosed as malaria.

## Discussion

Despite major global efforts to increase the availability of malaria care and treatment, many patients in sub-Saharan Africa still have limited access to these interventions including the availability of effective drugs (e.g. ACT).<sup>1</sup> In rural contexts with widespread poverty such as those sub-Saharan African settings described, access to effective malaria treatment can be substantially increased through: i) the provision of full, free care at health facilities for all or for large vulnerable groups, ii) the implementation of free, decentralised, community based treatment, and iii) the routine use of RDTs to confirm diagnosis and ACTs to ensure effective treatment. The findings raise a number of points that merit discussion.

First, our experience shows that in resource poor contexts like Chad, Sierra Leone and Mali, subsidising the cost of malarial diagnostics and treatment, while maintaining costs for other essential care (as is the national policy in many sub-Saharan countries), does not substantially increase health service utilisation and, for that reason, the uptake of effective malarial treatment remains low. Direct health-care costs at the point of use are, of course, not the only barriers to access: other direct and indirect costs (e.g. loss of time, transportation), distance, cultural factors, education and perception of low quality care at health centres are among the many other barriers to health-

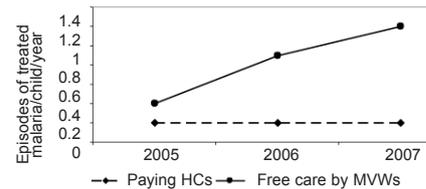
**Table 1. The average proportion of positive malaria results obtained with rapid diagnostic tests performed on cases presenting with fever (suspected malaria) in all age groups in Sierra Leone, Chad and Mali in 2006.**

	RDT positivity in the high malaria transmission season	RDT positivity in the low malaria transmission season
Bo district, Sierra Leone	65%*	
Bongor district, Chad	66%	43%
Kangaba district, Mali	63%	43%

RDT, Rapid diagnostic test; \* in Bo, Sierra Leone, malaria transmission is high throughout the year and is not influenced by seasonality, unlike in Chad and Mali.

care access in resource limited contexts. Nonetheless, there is substantial evidence showing that in contexts with widespread poverty, user fees alone exclude many people from care.<sup>10,15-20</sup> Adequate coverage of malaria needs through health centre care, cannot be achieved if these services remain underused.<sup>21</sup> MSF experience shows that only when care is offered completely free-of-charge at the point of use for all, or at least for large vulnerable population groups, do the number of people accessing effective malarial treatment, especially those most at risk, increase significantly with a corresponding fall in case fatality rates. The beneficial impact of free care (in terms of increased health service utilisation, better coverage of essential health needs and reduced mortality rates) has similarly been widely reported from other settings.<sup>22-29</sup> Despite the evidence, there is still some reluctance by national authorities and international donors to remove use/fees. While recognising that user fee removal needs accompanying measures linked to ensuring adequate financing for the provision of services together with the provision of adequate quality of services, in order to respond to the increased uptake of health-care services,<sup>30</sup> international donors and national governments urgently need to support this move. Until the financial barriers linked to user fees for essential public healthcare services are removed, subsidies or aid for malaria (and other diseases) provided through existing health services will continue to benefit only a limited number of people in need of care (i.e. have limited population impact) and will thus be an inefficient and inequitable allocation of resources.

Second, given that most young children die from malaria within 48 hours of the onset of illness owing to delays in seeking effective treatment,<sup>6</sup> early diagnosis and appropriate treatment are essential to reduce morbidity and mortality related to malaria among this group.<sup>1,31</sup> Free early diagnosis and prompt and effective treatment through decentralised care (using MVW) is a very efficient case management strategy for increasing coverage. Such practices at the community level are particularly important where geographical barriers hinder access to existing health facilities or the existing health facility infrastructure is



**Figure 2. A comparison of malaria treatment rates for children under 15 years of age in Bongor, Chad, according to whether care was received at paying health centres or free-of-charge from malaria village workers. HC, health centre; MVW, malaria village worker.**

limited. The success of this approach of task shifting to communities owes much to the availability of RDTs. Previously, confirmation of malaria diagnosis was only possible by microscopy, which is not feasible in remote rural settings nor at a community level.

Third, the routine use of RDTs reduces the misdiagnosis of cases of fever as malaria. This promotes rational drug use by: i) ensuring that a patient receives the correct treatment for malaria if confirmed, ii) encouraging the prompt evaluation and treatment of non-malaria fevers (which may otherwise contribute to mortality if left untreated), and iii) avoiding the unnecessary use of ACT for non-malarial fevers. In many African contexts with endemic malaria, patients with fever are routinely considered to have malaria and are treated as such, without any biological confirmation of the diagnosis (this is especially the case for children in high transmission areas).<sup>32</sup> In the absence of biological confirmation, these false positive cases would receive costly ACTs unnecessarily. This has important public health implications including: i) drug wastage, ii) exposure to rare but existing side effects, iii) poor treatment adherence (owing to a patient deriving no benefit from treatment) and, related to this, iv) the risk of development of drug resistance, as well recognised by the WHO.<sup>33</sup> Given these implications and the fact that often ACTs are in short supply and laboratory facilities scarce in many African contexts, treating malaria cases following confirmation by an RDT test is far more rational than treating suspected malaria cases on clin-

ical grounds. This is supported by new guidelines recently issued by the WHO,<sup>33</sup> stating that all patients with suspected malaria should undergo biological confirmation before treatment is prescribed. Additionally, RDTs can be used to confirm a diagnosis of malaria by non-clinically trained personnel such as lay malaria (or other) village workers. The inclusion of routine malaria diagnostics in national protocols and programmes, together with increased funding to ensure the availability of RDTs for routine use before ACTs are prescribed, should thus be considered crucial by stakeholders.

In three different African settings, provision of free, full care at the point of use, community based malarial care and treatment using MVWs and the effective diagnosis and treatment of malaria with RDTs and ACTs significantly increased coverage of effective malaria care and reduced mortality. These strategies are thus a key way forward for making progress toward achieving MDG targets, not only in malaria but also in maternal and child health. Furthermore, with health systems strengthening being high on the international agenda, the implementation of strategies that improve coverage of healthcare services and increased health service utilisation (especially through the provision of free care) will ensure a higher potential population impact and a much more efficient and equitable allocation of the funds and resources invested in health systems strengthening.

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