National Malaria Control and Scaling Up for Impact: The Zambia Experience through 2006

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Abstract. With its 2006–2011 National Malaria Strategic Plan, Zambia committed to control malaria at a national scale. This scale-up for impact approach was facilitated by sound business planning and financing in 2006 of approximately US$35 million. Compared with surveys in 2001 and 2004, a 2006 national survey of 14,681 persons in 2,999 households at the end of the transmission season showed substantial coverage increases for preventive interventions. Ownership and use rates of insecticide-treated mosquito nets (ITNs) among vulnerable groups doubled, with 44% of households owning ITNs and 23% of children less than five years of age and 24% of pregnant women using them. Roll Back Malaria Abuja targets for intermittent preventive treatment in pregnancy (IPTp) were exceeded, with 62% of pregnant women receiving at least two doses of IPTp. As of 2006, Zambia is demonstrating substantial progress toward the national targets (80% population coverage rates for the interventions) and aspires to show that malaria need not be its leading health problem, and that malaria control is a sound national investment.

INTRODUCTION

The launch of the Roll Back Malaria (RBM) Partnership in late 1998 marked a global commitment to halve the burden of malaria, with a focus on the persisting toll of the disease in Africa. In the intervening years, critical programming elements have been put into place, notably sound global and national policies,1–6 evidence for the efficacy of malaria control interventions7–14 and their cost-effectiveness,15–16 and a dramatic increase in external funding for malaria control in Africa.17 However, although national policies have been strengthened, the lag times with new funding for implementation1 (For example, although Zambia received GFATM malaria grants in Round 1 and Round 4, the first funding disbursements did not occur until late 2003 (Round 1) and late 2005 (Round 4). With long timeframes between initiating, receiving, and distributing prevention (e.g., ITNs) or treatment (e.g., antimalarial drugs) commodities, actual scale-up of intervention coverage has proceeded slowly.) have meant that confidence in the ability of African countries to undertake national-scale malaria control has not increased as rapidly as was anticipated. In the past three years, however, many African countries and their donor and implementing partners have embraced evidence-based national-scale programming to establish the credibility of malaria control and to realize its promise of burden reduction.

Building on the framework of the RBM Strategic Plan,1 a number of partners and malaria-endemic countries have invoked “scale-up for impact” as a rallying call for the rapid national-scale deployment of the full range of existing evidence-based malaria prevention and control strategies through true partnership commitment and intensive country work (Table 1). Scale-up for impact has two critical objectives: to build country-driven malaria control success to establish the feasibility and credibility of national-scope malaria control programming in the Africa region; and to develop a core set of programmatic principles and tools for malaria control to facilitate scale-up for impact across African nations. Scale-up for impact focuses on implementation strategies that attain high population coverage and on measurement and documentation of the reduction in malaria-associated health and economic burden.

Zambia was an early active participant in the RBM partnership. The country embarked on a strategic planning process initially for 2000–2005 and subsequently for the 2006–2011 National Malaria Strategic Plan (NMSP). Zambia received substantial support from donors including the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM); the U.S. Agency for International Development (USAID); and support to the health sector from a variety of bilateral and multilateral donors. The World Bank Booster Program and the Bill & Melinda Gates Foundation, which supports the Malaria Control and Evaluation Partnership in Africa (MACEPA) at PATH, began providing additional resources in 2005 to support the scale-up for impact focus of the NMSP. Most recently (2007), the U.S. President’s Malaria Initiative has begun providing support in Zambia. As an example of rapid scale-up for impact, this article documents recent progress in Zambia and identifies key components of successful programming in the areas of planning, resourcing, implementing, and monitoring and evaluating that must be addressed for national program scale-up in Africa.

Zambia and malaria control scale-up for impact. Geography and population. Zambia has a tropical climate with three seasons: a cool, dry winter (May–August), a hot, dry season (September–October), and a hot, rainy season (November–April). The annual rainfall varies from 600 to 1,100 mm across the country. Access to health care sites is often hampered by topographic characteristics including diverse mountainous areas, four large inland lakes, five major rivers, and large areas of swamps and islands that experience seasonal flooding. The population census in 2000 counted 9.8 million people; the 2006 population is estimated to be 11.7 million with an annual growth rate of 3.0%. The total size of Zambia is 752,612 km², with some sparsely populated provinces presenting additional...
TABLE 1
Scale-up for impact

Scale-up for impact frames malaria control programming by focusing on national deployment of the full “package” of evidence-based malaria prevention and control strategies through true partnership, commitment, and intensive country work to achieve high coverage and the impact that will come with that high coverage. It has specific implications for the following components:

- **Scope**—national scale and the full package of malaria prevention and treatment interventions.
- **Speed and timeliness**—rapid.
- **Achieving and documenting impact**—reaching high coverage with the interventions, reducing mortality and morbidity, and demonstrating benefits in social, economic, and human terms.

The scale-up for impact approach has been embraced by the Roll Back Malaria Partnership and is grounded in a commitment to the three ones where in-country and global partners commit to work from the following components:

- One national plan.
- One coordination mechanism for implementation of the plan.
- One monitoring and evaluation system.

Scale-up for impact embraces the cycle of planning, resourcing (human and financial), implementing, monitoring, and evaluating where scale-up is achieved and sustained in a structured and evidence-based fashion.

Finally, the documentation of malaria control impact should produce the evidence for advocacy whereby all partners commit to the durable support of malaria control—by country governments and the global donor community.

challenges in providing health services to small communities. Although most of the 9 provinces and 72 districts are rural, 2 of the provinces, Lusaka and Copperbelt, are largely urbanized and account for approximately 30% of Zambia’s population. An estimated 73% of the population lived below the national poverty line at the start of the RBM initiative.\(^{18}\)

Mortality in children less than five years of age declined from 197 per 1,000 in 1996 to 168 per 1,000 in 2002.\(^{19}\)

Malaria transmission occurs throughout the year in Zambia, with a seasonal peak between January and April. *Plasmodium falciparum* accounts for more than 90% of infections with *Anopheles gambiae* and *An. funestis* as the main vectors. All nine provinces are endemic for malaria with 90–100% of the population at risk. Approximately 4.3 million clinically diagnosed malaria cases and an estimated 50,000 malaria-associated deaths occur each year. On the basis of data from the Health Management Information System (HMIS), the number of malaria cases reported in Zambia has increased during the last 25 years,\(^{20}\) probably due to a combination of population growth, spread of drug resistance, reduced vector control, decreased access to health care, spread of human immunodeficiency virus infections, and poverty. In 2004, the total number of reported deaths in children less than five years of age decreased to its lowest level in six years, but malaria still accounted for 45% of outpatient visits, 45% of hospital admissions, 47% of overall disease burden among pregnant women, and 50% of disease burden among children less than five years of age. Malaria also has a serious economic impact on Zambia, accounting for 6.8 million disability-adjusted life years lost. This is higher than the figure for acute respiratory infections (5.4 million) or human immunodeficiency virus/acquired immunodeficiency syndrome (3.2 million).\(^{21}\)

**Launching the RBM partnership in Zambia.** At the outset of the RBM process in 1999, Zambia participated in global and regional RBM consensus-building activities, organized consultations with internal and external partners, and conducted the necessary steps for a successful introduction of RBM. The Ministry of Health (MOH) signed the RBM Abuja Declaration,\(^{22}\) and a ministerial task force was established for national policy formulation and to oversee the development of the 2000–2005 NMSP. The MOH set up institutional frameworks to oversee joint action by intergovernmental and intra-governmental agencies and the array of in-country partners, and the National Malaria Control Centre was established in 2002. National, provincial, and district situation analyses were conducted to inform the NMSP and the subsequent annual implementation plans. In the 1990s, the country had undergone decentralization for decision-making and budgeting in the health sector whereby districts controlled their local planning, resources, and implementation. Thus, RBM principles were introduced at subnational levels and included in the routine district planning cycles, enabling malaria prioritization in local resource allocation. In this way, RBM became embedded within the national health planning format and draws upon common basket resources under the sector-wide approach (SWAp) arrangement.

The Government of Zambia increased its allocations for malaria control from the national budget and, through an act of Parliament, eliminated taxation on malaria-control tools, including mosquito nets and relevant insecticides. Applications to the GFATM were successful in the first (2001) and fourth rounds (2004), for a total of US$83 million over 9 years. The USAID supported the malaria program with US$4–5 million annually, and other bilateral donors contributed either directly or through the SWAp arrangement.

With mounting evidence of reduced treatment efficacy of chloroquine and sulfadoxine-pyrimethamine,\(^{23–25}\) Zambia changed its first-line antimalarial-treatment recommendations in 2002 to artemisinin-based combination therapy (ACT).\(^{26}\) Insecticide-treated mosquito nets (ITNs) were prioritized and introduced through the private sector, social marketing with subsidized sales in antenatal clinics, and a variety of focal efforts in hospitals and select communities. In two mining towns, indoor residual spraying (IRS) was reintroduced in 2001, through an employer-based scheme. Malaria prevention among pregnant women, focusing on intermittent preventive treatment in pregnancy (IPTp) and ITNs, was introduced through the “making pregnancy safer” campaign. Support was provided to improve monitoring and evaluation through the existing HMIS by developing 10 sen-
TABLE 2
Evolution of National Malaria Strategic Plan Targets in Zambia*

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<tbody>
<tr>
<td>ITN coverage target</td>
<td>60% of HH with ≥ 1 ITN</td>
<td>RIBM principles and scale-up for impact concept</td>
</tr>
<tr>
<td>IRS coverage target</td>
<td>Not defined</td>
<td>&gt; 80% of HH with average of 3 ITN/HH</td>
</tr>
<tr>
<td>IPTp coverage target</td>
<td>90% of pregnant women using IPTp</td>
<td>&gt; 85% coverage of eligible HH in 15 target districts</td>
</tr>
<tr>
<td>Target for ITN use in pregnant women</td>
<td>50% of pregnant women sleeping under ITN</td>
<td>&gt; 80% of pregnant women receiving ≥ 2 doses IPTp</td>
</tr>
<tr>
<td>Target for ITN use in children &lt; 5 years of age</td>
<td>60% of children &lt; 5 years of age sleeping under ITN</td>
<td>&gt; 80% of children &lt; 5 years of age sleeping under ITN or in a house with IRS</td>
</tr>
<tr>
<td>Target for PECM</td>
<td>60% of sick persons have access to PECM</td>
<td>&gt; 80% of sick persons treated with effective antimalarial within 24 hours of onset</td>
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* RIBM = Roll Back Malaria; ITN = insecticide-treated mosquito nets; HH = household; IRS = indoor residual spraying; IPTp = intermittent preventive treatment during pregnancy; PECM = prompt effective case management (defined as treatment with recommended antimalarial drug within 24 hours of illness onset).
households with at least one ITN, approximately 50% of children and pregnant women slept under a net the previous night. On the basis of these findings, subsequent planning has focused on both increasing coverage and increasing regular use of ITNs for all household members including young children and pregnant women.

Case management coverage results are shown in Figure 2. The frequency of reported fever illness in children was somewhat lower in 2006, and the proportions of febrile children treated with an antimalarial drug (ranging between 52% and 62%) and treated promptly (ranging between 35% and 38%) were essentially unchanged between 2001 and 2006. Although the proportion of ACT use has increased from 0% to 8.4% to 12.7% in 2001, 2004, and 2006, respectively, the overall proportion of febrile children receiving any antimalarial promptly has remained stable, and by 2006 only one-fourth of those treatments were with an ACT.

The impact of this increased coverage is described in detail in a related article.28 In summary, these findings demonstrate that after adjusting for sex, age, urban/rural residence, asset-based wealth status, and location in an RBM sentinel district, compared with children living in households without ITNs or IRS, those in households with at least one mosquito net had significantly less fever illness, less malaria parasitemia, and less severe anemia. When considered nationally where 49% of households had at least one mosquito net, this intervention alone so far leads to an approximate 12.5–15% reduction in these malaria burden parameters nationally. As Zambia attempts to exceed 80% household coverage with ITNs, we can anticipate a national reduction in excess of 20–25% for these malaria burden measures with just this one intervention. Finally, it is particularly encouraging that these morbidity reduction parameters are similar to those found in the African randomized controlled trials of ITNs,29–36 which also demonstrate concurrent significant reductions in all-cause child mortality.7


**FIGURE 2.** Rates of childhood febrile illness and antimalarial treatment (overall and prompt), Zambia, 2001–2006.

**DISCUSSION**

With the inception of RBM, expectations ran high that malaria would be controlled rapidly in Africa. At that time, additional financing for malaria control at a national scale was not available either from malaria-endemic countries or external donors. In the absence of well-documented national examples of success, there was hesitancy about serious engagement in malaria control programming. In the initial five years of the RBM partnership, sound control plans were developed, national program capacity was built, the GFATM established substantial funding opportunities for malaria control, and re-
Implementation of prompt casemanagement and the expansion of diagnostics useremains challenging and requires continued attention. 2006 MIS showed less recent fever illness requiring treatment, but coverage of fever illness with prompt antimalarial drug was unchanged. Training in all districts completed; stock management remained a concern. Diagnostic training expanded slowly. Partner support for drugs expanded (GFATM, MACEPA, World Bank, USAID, and JICA to ensure financing; staffed team to plan distributions).

No major changes were introduced.

No major changes were introduced. Continued support for antenatal clinic delivery of IPTp through the Reproductive Health Unit.

NMCC worked with donors to support expansion of the “keep-up” program via ANC to all districts in all provinces. Supply systems, training, and implementation support was provided to all ANCs nationwide.

All 15 districts were scheduled for GPS mapping of eligible households. Calendar was reviewed and early procurement prioritized.

2006 MIS documented increasing coverage: 44% of HHS with an ITN and 23% of children sleeping under an ITN the previous night.

Malaria case management in young children 2006 MIS showed less recent fever illness requiring treatment, but coverage of fever illness with prompt antimalarial drug was unchanged. Implementation of prompt case management and the expansion of diagnostics use remains challenging and requires continued attention.

Although this 62% coverage level is short of the desired > 80% target, it does demonstrate the feasibility of effective service delivery. Further encouragement is offered to achieve the target.

"Catch-up" refers to strategies and procedures designed to achieve high coverage of the LLIN intervention. "Keep-up" refers to strategies and procedures designed to maintain high coverage of the LLIN intervention over time.

* ITN = insecticide-treated mosquito net; LLIN = long-lasting insecticide-treated net; HH = household; NMCC = National Malaria Control Centre, which is the coordinating center for the malaria control partnership in Zambia; GFATM = Global Fund to Fight AIDS, Tuberculosis and Malaria; MACEPA = Malaria Control and Evaluation Partnership in Africa; USAID = U.S. Agency for International Development; JICA = Japan International Cooperation Agency; ANC = antenatal clinic; MIS = malaria indicator survey, a national population-based sample survey to assess malaria control intervention coverage (see references 26 and 27); IRS = indoor residual spraying of insecticide; GPS, global positioning system; IPTp = intermittent preventive treatment in pregnancy; ACT = artemisinin-based combination therapy. 
† “Catch-up” refers to strategies and procedures designed to achieve high coverage of the LLIN intervention.
‡ “Keep-up” refers to strategies and procedures designed to maintain high coverage of the LLIN intervention over time.
sources started to increase as partners joined, including the World Bank Booster Program, the Bill & Melinda Gates Foundation’s support through the MACEPA program at PATH, and, most recently, the U.S. President’s Malaria Initiative.

African ministers made a pivotal commitment in Abuja in 1999 when they moved the target for programming from “halve the malaria burden” to a set of specific coverage targets for each of the core interventions.\textsuperscript{22} The RBM Global Strategic Plan for 2005–2015 raised the coverage targets from 60\% to 80\% on the basis of sound epidemiologic data.\textsuperscript{1} Partner and national funding has been increasingly focused on achieving these program-coverage targets on a national scale.

**Zambia: documented progress and a plan for impact.** Although Zambia is not unique in receiving substantial funding from multiple major donors, the government and the national partnership took bold steps in embarking on scale-up for impact. They committed to scale-up for impact principles, the three ones, and planning, resourcing, implementing, monitoring, and evaluating their malaria control efforts. As evidenced from the MIS in 2006,\textsuperscript{27} they are beginning to document the benefit—already achieving the Abuja target for use of IPTp, tripling rates of household ownership of ITNs between 2001 and 2006, and doubling the use of ITNs between 2004 and 2006. Although doubling and tripling coverage rates that began at low levels represents positive trajectory, attaining national coverage targets remains the critical achievement. The distribution of 2.5–3 million additional ITNs in 2007 and the full funding support for IRS in the 15 target districts provide a solid foundation for continued progress toward high malaria prevention coverage in 2008.

Zambia has made dramatic progress and has put in place a strong framework for national malaria control programming. Yet, notably, the 2006 coverage rates of prompt and effective case management remain low and unchanged in recent years despite the 2002 policy change to using ACTs. This is evidence that the choice of drug is only one component of a successful program strategy; challenges involving motivating ill people and their caregivers to promptly seek health care and educating health workers on effectively responding to potential illness are complex matters, particularly in light of the challenges inherent in drug procurement and supply systems. Other challenges, such as securing consistent financing to facilitate future planning and implementation, may be even greater.

Zambia successfully applied for Round 7 GFATM funds, financing that has to date served as the core resource for national scale-up. At the same time, Zambia will need to continue to promptly account for its resources used and document its successes to secure resources from other long-term partners. Zambia will need to maintain and expand the diverse in-country RBM partnership as it achieves high coverage rates and moves into systems of coverage maintenance. Progress in each of these areas is critical, not just for Zambia but for the confidence established in neighboring countries that malaria control is a good investment.

**Programming principles evolving from the Zambia experience with scale-up for impact.** Most, if not all, of the critical enabling factors for great progress in controlling malaria at the national scale are in place in many African countries. Donor and national commitment to address malaria control has never been higher, prompted by the sound science base suggesting that considerable health and economic benefit will accrue rapidly if a comprehensive package of control interventions is used by a large proportion of the population. Furthermore, financial resources are available in many countries to make concerted programming progress.

Several critical themes have emerged for the Zambian government and its partners during the initial two years, which form the basis for sustaining progress in Zambia and for initial strategizing as other countries embark on scale-up for impact.

The great challenge is to develop sound management systems for scale-up for impact. The iterative planning, resourcing, implementing, and monitoring and evaluating cycle is the crux of rapid and sustainable progress in national capacity to manage malaria control. Zambia’s investment in developing a detailed plan for its six-year goals and targets, paired with a formal annual plan for assessing progress and a budgeted business plan based on current program data, has been the key to strengthening partner coordination.

The government must coordinate the effort. The Zambia experience this past year reinforced the RBM community’s commitment to support national governments to lead malaria control efforts. Because the government is now a direct recipient of donor support, it has proven increasingly important for the MOH to directly engage contractors and local partners to ensure commitment to the annual planning and progress review processes.

Partners must work within the framework of the three ones. The concept of a single coordinating mechanism and evaluation system for scale-up for impact at the national level is intuitively logical. However, this is not how partners in malaria control have historically operated, and transitioning to a system where partners negotiate with government and one another openly to achieve a consensus plan requires flexibility and shared governance. Zambia has already demonstrated the power of such coordination, and partners have gained greater accountability in the process. A key success factor to date has been the proactive efforts evidenced by many partners to build a functionally single national malaria control program.

Documenting outputs and outcomes is key to effective program management. As noted above, Zambia, with coordinated partner support, is developing multiple innovative approaches to national malaria control. Although the success of the Zambian scale-up for impact effort is pegged to hard health and economic outcomes (e.g., trends in mortality of children less than five years of age and microeconomic conditions at the household level), some of the most transforming outputs in Zambia will be in the development of models for effective and efficient program management and administration.

**Scale-up for impact requires sustaining political leadership.** Not unexpectedly, the rapid rise of the malaria control profile and funding at the national level triggers political stresses. Leadership is required to manage potential issues around control of finances and personnel. The Zambia partnership has worked proactively to support leadership in mapping these forces, effectively balancing priorities, and having the facts and results to keep a focus on evidence-based decision-making.

**What is at stake?** Malaria control in Africa historically has existed under a cloud of hesitancy stemming from the per-
ception of unfulfilled promise and reluctance to adopt practical programming principles. Technically, malaria is fully controllable, and prevention approaches promoted to high coverage levels can sustainably alter the health and economic impact of the disease in Africa. Scale-up for impact represents a call for dramatic and coordinated action by national governments and their partners to control malaria in Africa, as well as a commitment to develop a consensus set of methods to support success. Although scale-up for impact builds on and reinforces the fundamental tenets in the RBM strategy, it also accelerates the time frame and emphasizes partnership among African nations and the malaria community. Progress is already occurring in many countries including Zambia, and the years through 2010 will be the critical time to establish the credibility of malaria control in Africa. There will be key actions, points of ownership, and areas of compromise and of stepping forward for each of the partners. We will know that scale-up for impact is working when sustaining national and global investment in malaria control is being driven by documented national success.

The fundamental principles of scale-up for impact, paired with strengthening the programming cycle, together can benefit a range of national disease control programs as the strategic investment in health systems and comprehensive monitoring and evaluation ensure that resources are being optimally applied. Recent calls for malaria elimination and eradication, which build on the extension or introduction of existing and new upstream interventions, will rely on the same programming cycle and principles that are now being deployed for malaria control program scale-up.

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13. Eradication, 2005, 38, 39, which build on the extension or introduction of existing and new upstream interventions, will rely on the same programming cycle and principles that are now being deployed for malaria control program scale-up.