WE CAN'T AFFORD TO WAIT:

The Business Case for Rapid Scale-up of Malaria Control in Africa

Prepared by Malaria No More and McKinsey & Company on behalf of the Roll Back Malaria Partnership

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EXECUTIVE SUMMARY

Malaria imposes a crushing human and economic burden, especially in Africa. The disease kills 1 million people a year globally, mostly children and pregnant women in sub-Saharan Africa. Malaria also costs the continent an estimated $12 billion a year in health costs and lost productivity, trapping hundreds of millions of people in a cycle of extreme poverty and perpetual illness.

Despite this bleak reality, the present moment offers real cause for hope. For the first time, proven cost-effective prevention and treatment tools combined with recent increases in malaria-control funding have enabled multiple African countries to slash malaria disease burden and deaths in the space of a few years. We are now presented with a historic opportunity to end malaria as a public health crisis in Africa.

Technical experts agree on the major pillars of an optimal malaria control strategy, including prevention, treatment, and support. We estimate that an investment of approximately $2.2 billion a year for five years (or $10.9 billion over 5 years) can achieve full coverage of prevention and treatment measures in the 30 hardest-hit malaria-endemic African countries, which together account for an estimated 90 percent of global malaria deaths and 90 percent of malaria cases in Africa.

This “rapid scale-up” approach will save millions of lives, produce tens of billions of dollars in economic returns, and provide the springboard for the ultimate goal of eradicating malaria. Over five years, this effort is expected to:

- Save 3.5 million lives
- Prevent 672 million malaria cases
- Free up 427,000 hospital beds in sub-Saharan Africa
- Generate more than $80 billion in increased GDP for Africa

In addition to the compelling humanitarian case, there’s an undeniable business rationale for rapid scale-up. Due to community health effects, rapid scale-up would be much more cost-effective than continuing the current funding path, returning substantially greater health and economic benefits.

In comparison to the current funding trajectory, rapid scale-up could save two and a half million additional lives, prevent more than 430 million additional malaria cases, and help generate $50 billion more in economic output over five years. What’s more, it would save twice as many lives for every dollar spent.

Rapid scale-up is affordable and technically achievable. It would save countless lives, produce dramatic economic benefits, and provide a springboard to the ultimate goal of

eradicating the disease. The question is not whether we can afford to aggressively attack malaria in Africa, but whether we can afford to wait.

INTRODUCTION

The last five years have created new hope in the fight against malaria. In partnership with international agencies and donor nations, a number of the most severely malarial countries have launched efforts to roll out proven, inexpensive measures such as mosquito nets and anti-malarial drugs. The private sector, too, has rallied to the malaria cause in part because of the high expected returns (both in public health and economic terms) of investing in malaria control.

Country-level data and field studies indicate that increasing returns can be achieved when interventions are applied in concert and coverage levels reach a critical threshold (due to "community health effects").

How much, then, could be achieved if we were to provide mosquito nets, anti-malarial drugs, and other tools to everyone in the world's most malarious region over five years? And how much would it cost? This report applies a business analysis to the prospect of rapid scale-up versus the continuation of the current trajectory by projecting the impact and cost-effectiveness of achieving full coverage of malaria control measures in the 30 hardest-hit countries in Sub-Saharan Africa over five years. This is not intended as a work plan for rapid scale-up, but is designed to show the expected return on investment if malaria control efforts were brought to scale.

We find that significantly higher returns and cost-effectiveness are achieved through rapid scale-up, arguing strongly for the front-loaded investments that this approach requires. In the private sector, this would be a "no-regrets move" as accelerated expenditures would produce far greater efficiency and returns. We encourage the global malaria community to pursue the same course with regard to scale-up of malaria control.

METHODOLOGY

The geographic scope of this report has been limited to the 30 countries in sub-Saharan Africa with the highest malaria incidence in order to demonstrate potential return on investment and focus attention on the world's most severely affected region (other recent projections have attempted to estimate the resources needed to fight malaria globally). Together, these 30 countries account for roughly 90 percent of the 1 million annual malaria deaths worldwide and 90 percent of the malaria incidence in Africa.

Our approach and analysis were developed in consultation with more than 30 leading experts across the key international anti-malaria partners, including the World Health

Organization (WHO), the Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Bank, the United Nations Children's Fund (UNICEF), and a host of non-profit and academic institutions. The projections are based on an intervention approach (including prevention, treatment, and support services) validated by leading technical experts at the WHO and elsewhere, and is consistent with the approach assumed in the WHO's recent report, "Estimated Global Resources Needed to Attain International Malaria Control Goals." The cost estimates were similarly built off of the assumptions in the WHO report, updated in certain cases to reflect new data. Finally, outcome estimates—i.e. projections of the impact of rapid scale-up on disease incidence and mortality—were generated based on a wide-ranging review of available data from country case examples and academic reports, and have been validated by our panel of disease experts.

THE CRUSHING BURDEN OF MALARIA

There are as many as half a billion malaria cases each year worldwide resulting in one to three million deaths annually.[1] Malaria kills more African children than any other disease, resulting in one death every 30 seconds on the continent.[2] For those who survive, the effects can still be crippling, resulting in debilitating fevers, anemia, or permanent neurological damage. Due to a devastating confluence of factors, malaria disproportionately affects Sub-Saharan Africa, which accounts for approximately 90 percent of global malaria-related deaths.[3] Africa is home to the deadliest form of the parasite, *Plasmodium falciparum*. It has the worst species of the vector, the *Anopheles* mosquito. And it has the climate most conducive to malaria's proliferation.

The disease traps individuals, families, communities, and entire countries in a cycle of poverty. Individuals often miss multiple days of school and work each year due to illness or caring for an ill relative. At the household level, malaria depresses income due to lost wages or production, while plunging families into debt with spending on emergency treatments. High malaria incidence in a village or district can have severe economic impact, as industries suffer from absenteeism and low productivity. These local effects, combined with larger macroeconomic factors such as depressed tourism and trade, are estimated to cost Africa approximately $12 billion each year.[4]

MOMENTUM AND EARLY SIGNS OF SUCCESS

Despite these hurdles, there is reason to expect that the malaria crisis can be tackled in Africa. The global community is rallying around an emerging set of common objectives. In the short-term, there is increasing momentum to dramatically boost funding to eliminate malaria as a public health crisis and immediately begin saving lives through the rapid scale up of proven malaria control measures. At the recent Gates Summit in October 2007, a number of leading global health organizations coalesced around the

long-term goal of eradicating the disease (i.e. by 2050), even as they acknowledged that new tools, including an effective vaccine, will be required to realize this goal.

National and organizational momentum is building to meet these goals as well. The Roll Back Malaria Partnership (RBM), a consortium of organizations committed to fighting malaria, was launched in 1998 to help coordinate efforts between international organizations, non-profits, private companies, and endemic countries. In fact, RBM has just launched a new task force comprised of leading public health institutions (WHO, World Bank, the U.S. President's Malaria Initiative, UNICEF, the Global Fund, the Gates Foundation, and Malaria No More among them) to coordinate aggressive scale-up over the next 36 months. Political and public health leaders, meanwhile, are emerging in endemic African countries to champion the cause of malaria control, and growing global awareness and public support is helping galvanize momentum and funding for the cause. A number of private sector organizations have become involved in developing the tools needed to fight malaria, including long-lasting insecticide-treated bed nets (LLINs) and highly effective combination drug therapies.

This momentum is generating significantly increased financial resources for the cause. Established in 2002, the Global Fund to Fight AIDS, Tuberculosis and Malaria has provided more than $3.6 billion in malaria funding, including $470 million in new commitments last year; the World Bank's Booster Program for Malaria Control in Africa has committed nearly half a billion dollars since 2005; and the United States President's Malaria Initiative (PMI) has pledged $1.2 billion to 15 malaria-endemic countries between 2005 and 2010. Programs funded by the Global Fund alone have distributed 46 million bed nets since 2002, including 28 million in 2007. The Gates Foundation has contributed $79 million to The Malaria Control and Evaluation Partnership in Africa (MACEPA) in Zambia to scale-up and document best practices in fighting malaria, alongside the hundreds of millions of dollars the foundation has contributed to the research and development of new drugs, diagnostic tests, and vaccines to fight malaria. A broad group of additional organizations, including non-profits, global businesses, and bilateral donors, have added significant resources to this mounting effort.

African governments are putting these new resources to good use, demonstrating that they can slash malaria incidence and deaths in the space of a few years. Four years ago, Ethiopia lagged behind many of its neighbors with only five percent of households owning a single bed net. Having distributed more than 18 million bed nets since 2005, Ethiopia is now approaching an unprecedented goal: two long-lasting insecticide-treated nets for every household in malaria-endemic areas[5]. During one week in December 2007, Mali managed to distribute more than 2.1 million bed nets, covering 95 percent of all children under 5 in the country.[6]

While many programs are just beginning to measure impact, we already see encouraging signs of success. Between 2003 and 2006, Zanzibar implemented a mass bed net distribution campaign that raised population-wide coverage from 10 percent to 90 percent, while also providing the entire population with access to free artemisinin-based combination therapy (ACT) medication. This concentrated effort produced a 75 percent drop in malaria-related mortality in children under five between 2002 and 2005 and a 77 percent drop in malaria-related hospital admissions.[7] Using a combination of bed nets, medication, spraying, and environmental management**,** Eritrea has managed to reduce malaria deaths by 85 percent and reduce incidence by 63 percent since 1999.[8] A recent survey of 2,300 households showed 67 percent ownership of bed nets in Eritrea**.**[9]

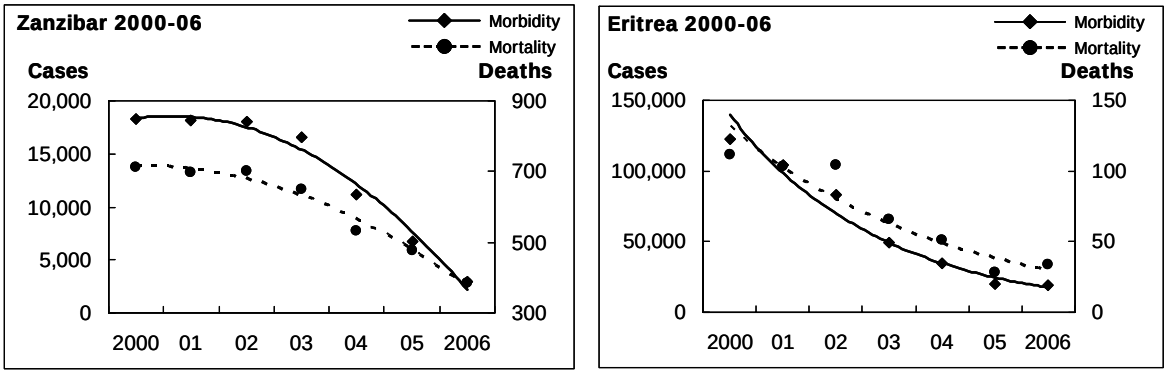

Figure 1: Decrease in morbidity and mortality in Zanzibar and Eritrea, 2000-2006[10]

IMPACT AND COST OF RAPID SCALE UP

These early success stories indicate that a broader effort could have a significant impact across the continent. It is not practical to expect to eradicate malaria in the next several years, but it is possible to lower incidence to a level where malaria-related sickness, hardship, and death are drastically reduced. Beyond the clear moral imperative to do so, there is also a compelling economic and social development rationale to aggressively attack malaria with the tools now at our disposal. Our analysis shows that rapid scale-up over five years in the 30 hardest hit African countries would *save* 3.5 million lives, prevent 672 million malaria cases, free up 427,000 hospital beds in sub-Saharan Africa, and generate more than $80 billion in additional economic output for Africa. What follows is a comparison of the impact and cost-savings of rapid scale up versus a continuation of the current funding path. (The core technical elements of malaria control that underpin this model are described in an addendum to the paper.)

A rapid scale-up of malaria control in the 30 hardest hit African countries could achieved for $10.9 billion over five years, or about $2.2 billion a year. Prevention efforts constitute the largest share of investment required, with $4.4 billion needed over the five-year period. Of that total, $3.4 billion would be spent on long-lasting insecticide-treated bed

nets (LLINs). LLINs would be distributed to 100 percent of the population within four years, and we expect that approximately 68 million nets would be needed each year for four years in order to achieve 100 percent coverage. By year 5, we expect all LLINs to be resistance-breaking nets that last five years. The average annual cost per person for a LLIN is $1, making it a very cost-effective way of directly protecting individuals and indirectly protecting others in their communities.

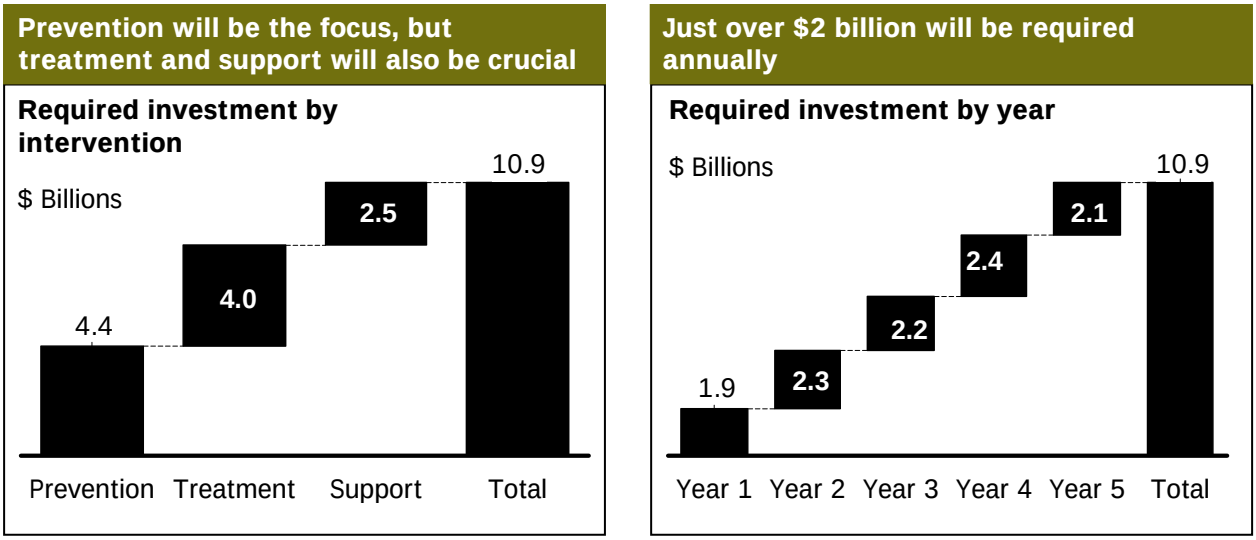

Figure 2: Spending projections for scale-up, Year 1 - 5

We assumed Indoor Residual Spraying of insecticide (IRS) to reach 20 percent of homes in target countries, providing additional protection above and beyond LLIN coverage. IRS would cost just under $1 billion for the five-year period, with the average annual cost per person for indoor spraying totaling $3.50. IPT for pregnant women would be provided for all women living in endemic areas (84 percent of the total) by Year 5. This treatment for pregnant women is also relatively inexpensive, costing only $0.20 plus distribution per intervention and requiring less than $200 million in investments for the five-year period.

While prevention anchors our approach, a strong focus on treatment would also require $4.0 billion over five years to manage cases and reduce the number of deaths that result from severe malaria. Currently, less than 10 percent of malaria victims have access to artemisinin-based combination therapies (ACTs). We estimate that it will cost $1.8 billion to scale-up over five years so that all infected persons can be provided with ACTs. The cost of treatment courses per person is low; the average annual dosage of ACTs costs only around $1.17 plus distribution costs**.** Rapid diagnostic tests (RDTs) would require $1.4 billion in investment so that all adults with malaria-like fevers would be tested by year 5 and all children under five would be tested by 2011. RDTs have a unit cost of $0.70 each and are essential in ensuring that only patients that actually have malaria receive treatment.

Finally, $2.5 billion would be needed for associated support costs and health system strengthening. These projections build on the World Health Organization's well-respected assumptions for the support needed to reach the 80 percent coverage, which aim to reduce malaria-related mortality by 50 percent in five years and by 75 percent in ten. The largest share of support costs would be the investment in infrastructure at $1.1 billion. This figure includes substantial investments in staffing and management at the national level, transportation, and storage. Wages for CHWs comprise the second-largest investment within support at $664 million. Monitoring and evaluation investments are almost $400 million. Education and communications models are also vital to ensure high utilization of available preventative and treatment measures.

Beyond to the additional capacity this support spending would create for health systems, rapid scale-up of malaria control promises to free up critical resources for addressing other pressing health problems by drastically reducing malaria incidence. Malaria currently imposes an overwhelming strain on health systems in endemic African countries, where it accounts for up to 40 percent of health expenditures, 25 to 40 percent of hospital admissions, and up to 50 percent of outpatient visits. The projected 427,000 hospital beds that will be freed up in these 30 countries over five years is only one measure of how rapid scale-up will strengthen health systems.

It is important to note that maintenance spending after year 5 will be crucial to preserve the gains achieved during rapid scale-up. Total spending declines from approximately $2.2 billion per year during scale up (years one through five) to approximately $1.8 billion per year during surveillance and maintenance phases. LLINs will have to be replaced every five years and other prevention measures, including IRS and preventative treatment during pregnancy, will be maintained at scale-up levels**.** Treatment costs will decline following scale-up as demand for ACTs fall and severe malaria cases decline. Support costs will decline after scale-up, reaching a maintenance level to ensure quality treatment and successful ongoing prevention efforts.

A STRONG BUSINESS CASE FOR RAPID SCALE-UP

Consider how these investments compare to our current funding trajectory for malaria control, as shown in Figure 3. With an assumed 10 percent annual growth in donor funding, approximately $6 billion will be contributed to malaria efforts in sub-Saharan Africa over the next five years. Under these assumptions, LLIN coverage is estimated to reach 57 percent in 2012, up from the current rate of 20 percent. While this is a significant increase, it implies that many villages will not fully realize the efficiencies (through community health effects) of reaching 60-80 percent coverage. Indoor spraying, however, would only reach 4 percent coverage by 2012, largely because the infrastructure for spraying is not in place across the sub-continent and much of the focus has been on

providing LLINs. Preventative treatment for pregnant women would increase to 40 percent of the pregnant population from its current rate of 12 percent.

Access to treatment under the current trajectory would not increase as fast as prevention efforts. ACT coverage would increase from 8 percent to 13 percent, which is largely due to the fact that without a significant scale up on LLINs and RDTs, a high number of malarial fevers will persist. In addition, there has not been a large push to distribute ACTs in the last five years the way that there has been to distribute LLINs. We assumed both of these interventions would remain at low coverage rates (if the much-discussed ACT subsidy comes to fruition, these effective drugs could become much more widely available.)

	Current: 2007	**Projected: 2012**		**Cost**
	Percent	**Current funding path** Percent	**Rapid scale-up** Percent	Dollars
LLIN coverage	~20	57	100	$1 annual cost per person
ACT coverage	~8	13	100	$1.17 unit cost plus distribution
IPT coverage among pregnant women	~12	40	84	$0.20 unit cost plus distribution
RDT coverage	Negligible	0-10	100	$0.70 unit cost plus distribution
Homes receiving IRS	Negligible	4	20	$3.50 annual cost per person

Figure 3: Coverage levels reached by current and projected funding levels

Given its significantly higher coverage rates, rapid scale-up could produce outstanding results when compared to the current funding trajectory. Malaria incidence has been reduced as much as 95 percent through scale up in Zanzibar, Tanzania. But given the paucity of data from high coverage settings, we assume a more conservative number of 80 percent decline achieved through rapid scale-up**,** compared to only around 25 percent in the current trajectory. This sizeable difference in impact translates into a wide gap between the health and economic benefits that can come from a rapid scale-up approach and a continuation of the current trajectory.

The health impact of a rapid scale-up is powerful. Our analysis shows that 3.5 million lives could be saved over the next 5 years with rapid scale-up, which is 2.5 million more lives saved than with the current trajectory. Similarly, about 672 million cases could be averted with rapid scale-up, which is 430 million more cases than with the current

trajectory. With declining cases each year, a projected 294,000 more hospital beds (there are approximately 1.6 million hospital beds in these thirty countries) could be freed up for use by non-malaria patients at any given time by year 5, an example of how the massive reduction in the malaria burden could free up substantial health system resources to fight other diseases.

An analysis of returns per dollar invested reveals that a rapid scale-up plan is substantially more cost-effective than a continuation of the current funding trajectory. This is due to the benefits of community health effects and the significantly increased probability of success with a large-scale effort.

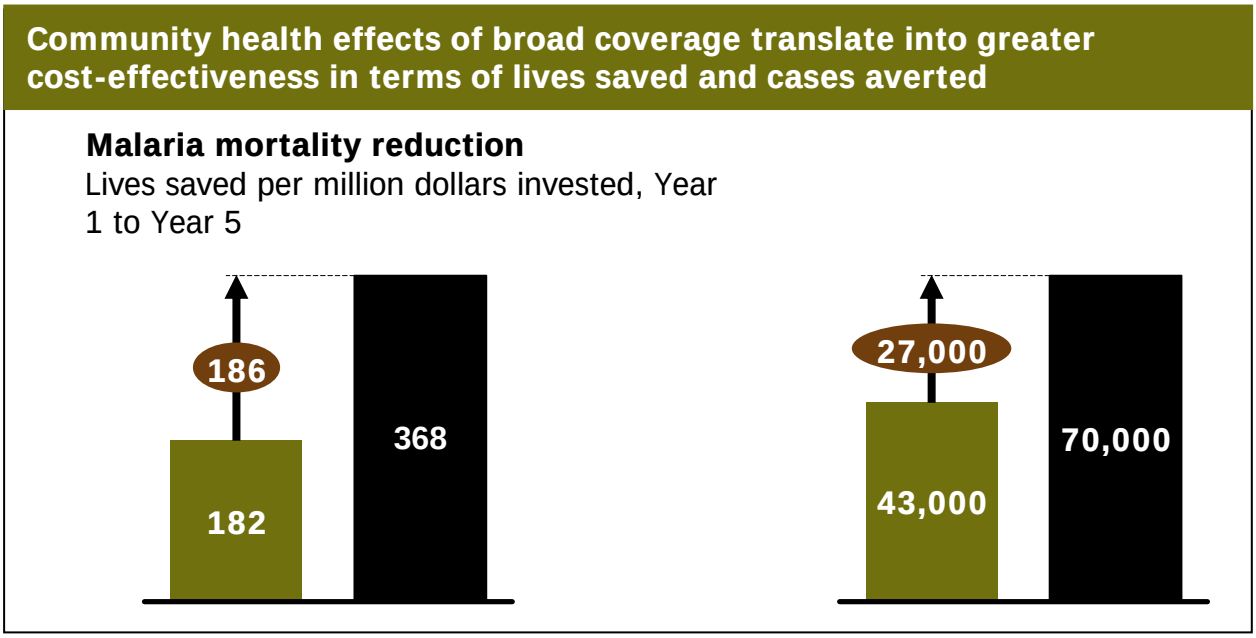

Figure 4: Additional lives saved and cases averted per million dollars invested

Figure 4 illustrates how much more cost-effective a rapid scale up effort is: 368 lives could be saved per million dollars invested, which is 186 more lives per million dollars spent than the current trajectory—more than double the result. Similarly, 70,000 cases could be averted per million dollars invested in the rapid scale-up effort, which is 27,000 more than with the current trajectory.

Rapid scale-up against malaria is likely to support substantial economic growth in sub-Saharan Africa within just five years

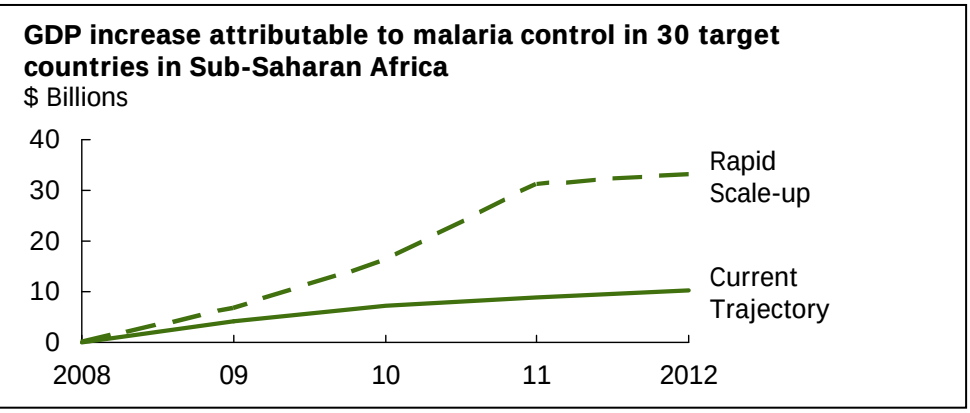

Figure 5: Additional GDP attributable to rapid scale-up in malaria intervention

The economic benefits generated by a rapid reduction in the malaria burden could also be sizable. Combined GDP for the 30 most malarious countries in sub-Saharan Africa could increase by more than $20 billion in 2012 compared to the GDP of the same countries with only an incremental scale-up of coverage (following Sachs and Melaney, we assume a 0.3 percent increase in GDP for a 10 percent reduction in the malaria burden[11]). The combined GDP of these thirty countries is approximately $1 trillion,[12] so this increase in GDP represents 3 percent more in economic activity across the sub-continent and an additional $168 of economic output per household within five years. Ridding a country of malaria can also drive greater growth by increasing tourism, as Greece did in the 1950s.[13] Foreign direct investment may also increase, as can be seen by the manufacturing success of Mauritius after it eliminated malaria from its shores.[14]

Aside from broad macroeconomic metrics, a reduction in the malaria burden could transform the daily lives of sub-Saharan Africans. In the first two years of Mozal, a joint venture led by London-based mining and metals company BHP Billiton, the workers at their aluminum smelter in southern Mozambique experienced a collective 7000 cases of malaria.[15] The company made efforts to contain the disease in that region and consequently boosted the health of its workforce and doubled output at the plant in just three years. Across sub-Saharan Africa, we expect that adults could spend two fewer days a year either ill themselves or caring for a sick child as a result of rapid scale up. Similarly, primary school children could miss 7.8 fewer school days per year and be less susceptible to the mental disabilities that can come from a bout of severe malaria. These positive effects on children could likely generate advances in these countries' human capital accumulations for generations to come.

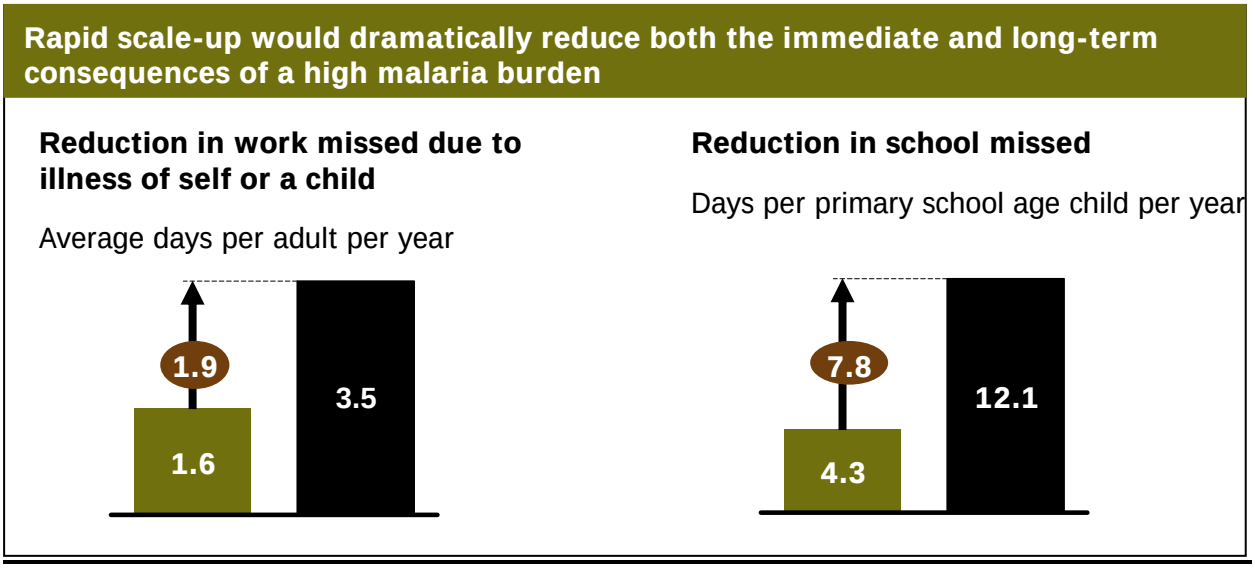

Figure 6: Reduction in work and school missed through rapid scale-up of malaria interventions

LOOKING FORWARD

A major effort is underway to develop vaccines that would make elimination of malaria possible in sub-Saharan Africa and eradication feasible worldwide. The success of one or more of them, even if it is only partially effective, would be a major victory in the fight against malaria. But we cannot wait for to take decisive action until a vaccine is developed, approved by regulators, affordably manufactured, and distributed across Africa. Our analysis shows that stepping up efforts now with currently available tools will cost-effectively save lives, reduce disease burden, and boost sub-Saharan African economies in the short-term. Only by significantly lowering the number of people carrying malaria parasites can we reduce transmission to a level where an effective vaccine can help us reach the ultimate goal of eradication.

We believe that the international community can work with endemic countries to all but rid sub-Saharan Africa of malaria-related deaths over the next five years. The tools to fight the disease effectively are well-known and highly cost-effective. It would cost about $10 billion to end malaria as a public health crisis in sub-Saharan Africa in the next five years, but that investment would return health and economic benefits far exceeding the cost. The question to ask is not whether we can afford to aggressively attack malaria, but whether we can afford to wait.

ADDENDUM: THE KEY ELEMENTS OF MALARIA CONTROL

There is broad consensus as to the key elements of malaria control in the areas of prevention, treatment, and support. While these established approaches need to be tailored to each specific malaria-endemic area, they represent a common starting point on which technical experts agree. (Figure 7 lays out the standard approaches to prevention and treatment based on regional/national conditions).

1) Prevention

Prevention efforts anchor the rapid scale up of malaria control in sub-Saharan Africa. Without significantly improving prevention, *P. falciparum* parasites will continue to plague a large portion of the population and malaria transmission will be difficult to reduce. The consensus approach is to aim for 100 percent coverage with LLINs and/or indoor spraying, depending on local epidemiology and infrastructure. (In fact, each country will require a partially tailored approach involving a mix of prevention methods that include some non-core interventions such as environmental management and source reduction.)

In most of sub-Saharan Africa, five-year long-lasting insecticide-treated nets offer the simplest way to achieve high coverage levels. They are relatively inexpensive, easy to distribute, and generally embraced to the public. New technology has continually improved LLINs, which have increased in useful life from three to five years, and are now being equipped with resistance-breaking formulas that can kill mosquitoes that are already immune to pyrethroid insecticides. Our model follows the standard recommendation of maximizing LLIN coverage through mass distribution ("catch up") campaigns and maintaining coverage through routine private and public sector distribution ("keep up campaigns"). Such campaigns must be fully supported by education and awareness programs to drive high utilization and proper usage (see Support for more).

Indoor residual spraying with insecticides (IRS) is also highly effective, but only recommended under certain circumstances due to deployment challenges. Most countries have not built up a national spraying infrastructure that is capable of quickly and cost-effectively scaling up spraying campaigns. Further, people often resist spraying campaigns, particularly when repeated sprayings are required in a single year or when their homes must be sprayed year after year (as is generally the case in high-transmission areas). Therefore, IRS is suggested as a supplement to LLINs in targeted areas (e.g., high transmission areas, mines, irrigated agriculture schemes, and urban areas). If IRS infrastructure does not currently exist, then countries may choose to use NGOs to implement this targeted spraying at initial stages and to help build local capacity and infrastructure. In epidemic areas, where LLIN coverage is not sufficient to prevent outbreaks, IRS is highly effective if a trained spray team can be mobilized to protect a

majority of homes. Again, NGOs are particularly useful in helping build IRS capability if it does not already exist in epidemic prone areas.

Finally, all pregnant women in endemic areas need to take intermittent preventative treatment (IPT), such as sulfadoxine pyrimethamine, to reduce the transmission of the malaria parasite to the child and help prevent low birth weights and anemia. With a majority of women attending antenatal clinics, appropriate drugs can easily be distributed at an extremely low cost.

2) Treatment

While strong prevention efforts will help greatly reduce the presence and transmission of parasites from person to person, a comprehensive treatment approach is needed to save lives and rid patients of parasites, preventing further transmission of the disease. The World Health Organization (WHO) recommends the use of artemisinin-based combination therapies (ACTs), which are highly effective in preventing the disease's progression, when resistance to traditional monotherapies exceeds 10 percent. As a result, most African countries have adopted ACTs as a first line treatment. Further, the WHO has recommended a ban on all artemisinin monotherapies to prevent drug resistance from emerging.

Rapid diagnostic tests (RDTs) also play an important role in fighting drug resistance by ensuring that ACTs are only given to patients who actually need them. While acknowledging that there are currently difficulties with distribution and proper usage of RDTs, the WHO recommends that all patients be diagnosed prior to ACT treatment, with the exception of children under five in endemic areas, who should be treated presumptively. Accordingly, quality-controlled RDTs must be distributed in conjunction with ACTs.

ACTs are currently distributed through public sector health facilities, community health workers, and the private sector. ACTs will likely continue to be distributed through all three channels, so it is highly important that drugs are quality-controlled and monitored to avoid the distribution of any that have expired or are counterfeit. Organizations such as Population Services International (PSI) have helped develop innovative packaging to ensure that medications are easy to take properly, which is particularly important when drugs are administered outside traditional health facilities.

Finally, since a small fraction of cases progress to the disease's most serious stage, patients should have access to severe malaria case management resources through district hospitals.

Epidemiological/ infrastructural conditions	Interventions: LLINs	IRS	IPT	ACTs
Endemic malaria, with IRS infrastructure	Maximize coverage	Use as a supplement to LLINs in targeted areas (e.g., mines, agricultural irrigation) to enhance coverage	⇧	⇧
Endemic malaria, without IRS infrastructure	Maximize coverage	Build capacity in targeted areas (e.g., mines, agricultural irrigation) with NGO support	• Provide all pregnant women with access to IPTp at antenatal clinics	• In endemic areas, treat children under 5 presumptively with ACTs • In all other situations, provide diagnosis-based treatment
Epidemic malaria, with IRS infrastructure	Maximize coverage	If LLINs have not sufficiently prevented outbreak, use IRS if high coverage can quickly be achieved		
Epidemic malaria, without IRS infrastructure	Maximize coverage	Build capacity for epidemic emergencies with NGO support	⇩	⇩

Figure 7: Standard intervention approach

3) Support and Health System Strengthening

Investing in support is essential to deliver high-quality interventions and build malaria control systems that are sustainable over the long-term. First, countries must bolster their malaria control infrastructures, which entails hiring managerial and professional staff, strengthening health information systems, and upgrading storage facilities for commodities. Talented managers are essential in running effective malaria control programs that can properly manage and communicate with local health workers, scientists, government and international officials, and the private sector. Health information systems are needed to improve communication and coordination and to ensure that commodities are delivered on time where they are needed.

Community health workers (CHWs) are needed to properly educate people within communities, perform diagnoses and deliver life-saving interventions. Due to their familiarity with local customs, CHWs are uniquely positioned to help make community members aware of the need for malaria prevention and treatment. Further, they can be trained in basic malaria diagnosis and treatment and can leverage the resources of local health facilities when distributing medications to remote villages. Historically, there have been challenges related to high attrition rates among CHWs due to the overwhelming numbers of malaria patients and poor compensation levels. Our model provides for CHWs to receive substantial training and to be paid a living wage; examples from Brazil and Southeast Asia show that these measures can greatly improve recruitment and retention.

Third, mass communication and education efforts must be undertaken to ensure that citizens in Sub-Saharan African are aware of prevention and treatment options and know

how to properly use them. Surveys by UNICEF and others have consistently found bednet usage levels significantly lower than ownership. Proper education is needed to get people to sleep under a bednet every night and to seek ACTs soon after symptoms of malaria appear. Stimulating behavior change is one of the most important elements of ensuring long-term program success.

Finally, monitoring and evaluation and operational research are needed to help ensure high program performance and to drive evidence-based operational decisions. Funding for monitoring and evaluation, both routine impact data collection as well as drug and insecticide resistance monitoring, has been extremely low. Routine surveillance is needed to assess the quality of interventions and to assist managers in making operational decisions. Drug and insecticide resistance monitoring, which require separate sentinel monitoring sites and labs, are essential in detecting when tools are being overused.

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12 CIA World Factbook

13 Sachs and Malaney

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