



Economic Commission for Africa

Enhancing health Systems: Malaria's Negative Impact in Africa

ESPD, Poverty and Social Policy Team

October 2005

Contents

	Pages
Introduction	2
Malaria figures at a glance	2
Malaria an African disease	6
International commitments to tackle malaria	6
Millennium Development Goals and malaria	6
Some trends	8
Synergies across MDGS	10
Malaria and education	10
Malaria and health	11
Malaria and poverty	12
Abuja roll back malaria	13
Monitoring framework	15
Trends up to 2001/2002	16
Current trends	18
The Economics of malaria: A clarion call for action	21
Conclusions and recommendations	24
Scaling-up interventions in malaria control	24
Reinforcing health systems	25
Shifting Government strategy	25
Forging partnerships	26
Mobilizing financial resources	26
Research and development	28
Bibliography	29

Introduction

The high malaria morbidity cases and the mortality rates caused by malaria are an issue of serious concern. Malaria is a grave global problem. However, the malaria epidemic in Sub-Saharan Africa (SSA) is even more severe and causes much higher damage. Sub-Saharan Africa is home to the most efficient vector, the *Anopheles gambiae* and *Plasmodium falciparum*, a form of the parasite, which has developed resistance to conventional drug therapy.

In addition, this public health challenge in Sub-Saharan Africa is further compounded by poverty, which in turn is one of the determining factors of the malaria epidemic. Malaria has a significant effect on human capital accumulation, and decreases economic growth. Furthermore, malaria has a higher negative impact on vulnerable groups. Pregnant women and children under 5 are the most vulnerable. Thus, the disease, with its impact on falling educational outcomes, and the deepening of poverty levels seriously affects future generations.

Malaria also has an effect on the working population. In adults recurrent bouts of fever lower labour productivity. The transmission period of malaria coincides with the planting season, thus further lowering agricultural productivity. Lower productivity contributes to lower economic growth and the poverty levels, depth and severity that characterize most endemic Sub-Saharan Africa countries.

This state of affairs has been recognized and acknowledged in international and regional fora. The Millennium Development Goals (MDGs) has a target to halt and reverse malaria prevalence by 2015. The African heads of State have endorsed a plan of action in Abuja 2000 to Roll Back Malaria. Both these declarations have recognized that malaria is a development challenge, rather than a simple health issue. A development to move from wish lists, and establish monitorable time bound targets to spur action in tackling the disease is noteworthy. This report uses the assessment matrix developed in a previous Economic Commission for Africa health report *Scoring African Leadership for Better Health* to monitor progress towards the Abuja targets.

However, the progress towards these targets has been unsatisfactory. Malaria still continues to take a toll on health systems and contributes significantly to high morbidity and mortality rates. However, since 2000 there has been an improvement in drug therapy in most Sub-Saharan countries and better home management of malaria cases.

The investment in malaria prevention and treatment is crucial for the well being of the population. Besides, this is grounded in the economic viability of such investment. The rates of return to health investment in general, malaria in particular, are high. For example an increase in Insecticide Treated Nets (ITNs) by under 5s in SSA, from the present 3-5 per cent to 70 per cent would provide a

benefit of nearly \$18 billion at a cost of \$1.77 billion. Providing a two-stage anti-malaria treatment to 90 per cent of women in their first pregnancy would protect 5 million mothers at a cost of \$0.5 billion, while delivering benefits of \$6.2 billion, a benefit/cost ratio of 12.1 (Mills & Shullcutt 2004). In addition, malaria investments have an immediate effect and do not suffer from the time lags in educational investment.

However, the acceleration of progress already achieved is possible. The targets are achievable if political commitment, adequate resources, and scientific knowledge are directed towards malaria prevention and control. This will not only have an overall effect of better well being of Africa's population, but increase economic growth and reduce poverty. In fact 1.7 per cent of annual economic growth (representing 50 per cent of GDP increase) in East Asia between 1965 and 1990 has been attributed to massive improvements in public health (Mills & Shullcutt 2004).

Malaria figures at a glance

Malaria remains a major global problem, exacting an unacceptable toll on the economic welfare of the world community. An estimated 300-500 million people a year are affected. One million malaria deaths occur each year (UN 2005a). It is a major cause of low birth weight in newborns, anemia and infant mortality. Episodes of malaria cause stunting in children's physical and mental development. This in turn contributes to impaired cognitive development, lower completion primary school rates and lower returns to education. Besides, malaria can have a debilitating effect on adults, with recurrent bouts of fever that induces increased absenteeism from work, and lower labour productivity.

Some facts

- Countries with intensive malaria exhibit a 1.3 per cent loss in economic growth
- More than 90 per cent of the world's malaria burden is in Africa
- At least 20 per cent of all childhood deaths in Sub-Saharan Africa can be attributed to malaria
- In Africa malaria transmission coincides with planting and harvesting , thus seriously hampering agricultural production

Source: UN 2005b, Sachs 2000

The impact of malaria on economic growth is particularly devastating. 29 per cent of endemic malaria countries that have a population of over 1 million had an average GDP per capita of \$1,526 (in 1995 Purchasing Power Parity (PPP) terms), compared to non-endemic malaria countries that stood at \$8,268. Growth of

income per capita between 1965 and 1990 for countries with malaria was 0.4 per cent on average, whilst those countries without malaria achieved 2.3 per cent during the same period (Sachs 2000). Its impact on economic growth is substantial. The channels through which malaria contributes to lower economic growth are a general decrease in human capital-child mortality and reduced educational outcomes, higher health spending, exacerbated malnutrition, and lower labour productivity of adults due to losses in work time.

This implies that malaria and poverty are intimately related. Malaria is prevalent in the poorest countries. This is not the same as saying poverty causes malaria or is a consequence of malaria. Its transmission is determined by ecology and climate, although poverty is a compounding factor of malaria. Furthermore there is evidence of a positive correlation between reported fever, treatment of malaria and higher wealth. In fact, the poorest groups in a society do not seek care as much as the non-poor, and when they do it is at a lower level of public facilities (Filmer 2002).

Although malaria is a global problem, its severity and virulence in Sub-Saharan Africa (SSA) is much higher. Around 59 per cent of cases of clinically confirmed malaria cases and 1 million malaria deaths occur in SSA (See Box 1). This is based on epidemiological data being upgraded for better informing public health policy.

Box 1

A new methodology for estimating Global Distribution of clinical Malaria cases

In 2004 an improved method for estimating clinical malaria episodes for all countries was developed by the Roll Back Malaria task force on malaria morbidity. This new methodology will allow regular updating for tracking the Roll Back Malaria and the Millennium Development Goals trends and targets.

The estimates are based on populations living at different malaria endemic levels in urban and rural areas of all countries and by age group. Incidence rates are estimated based on a literature review of community-based longitudinal studies. Country specific estimates are then adjusted for local coverage and the impact of Insecticide Treated Nets (ITNs), based on data from household surveys.

In January 2005 estimates indicate that 59 per cent of the world's clinical malaria cases occur in Africa, around 38 per cent in Asia and 3 per cent for the Americas. For falciparum malaria specifically, the estimated regional distribution is around 74 per cent in Africa, 25 per cent in Asia and around 1 per cent in the Americas.

Source: WHO 2005

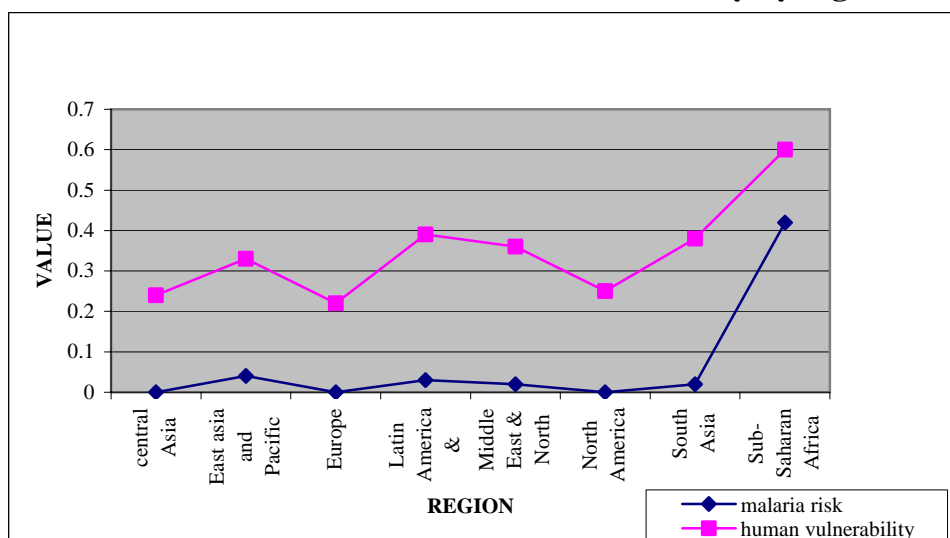
Malaria an African disease

Morbidity and mortality rates are also the outcome of parasite-vector-human transmission dynamics that favor or limit transmission. Of the four species of Plasmodium that infect humans- *P.falciparum*, *P.vivax*, *P.malariae*, *P.ovale*- the *P.falciparum* parasite causes most of the severe malaria cases and is found predominately in SSA. The most competent and efficient vector is the mosquito *Anopheles gambiae*, exclusively found in Africa. The predominance of the deadliest parasite and the most efficient vector in Sub-Saharan Africa is an enormous challenge. The *Anopheles gambiae* is the most difficult to control. In addition the *P.falciparum* parasite is resistant to chloroquine, the drug treatment most often used in SSA.

Young children are at risk because of the lack of clinical immunity that occurs later in life. Pregnant women are particularly at risk because during pregnancy immunity to malaria is temporarily impaired.

Thus, the high malaria risk in Africa compared to other regions contributes significantly to human vulnerability¹ (See Figure 1). Human vulnerability in 1980 was inversely correlated with economic growth during the period 1980-2000 (UN 2005). As can be seen from Figure 1 malaria risk contributes significantly to overall vulnerability. In effect tackling malaria would result in an overall decrease in vulnerability and in turn decrease poverty.

Figure 1
Malaria risk and human vulnerability by region



Source: United Nations, 2005a

¹ The human vulnerability index is an average for agriculture risk, transport risk, and malaria risk. In SSA the malaria risk contributes approximately 25 per cent to the overall index.

The high contribution of malaria risk to overall human vulnerability is significant. In rural Sub-Saharan Africa, child mortality caused by malaria has increased two-fold during the 80s and 90s, whilst mortality resulting from other diseases decreased over the same period (Korenromp 2003, Rowe 2005). Furthermore malaria has a large impact in SSA countries because of its interaction with malnutrition. Malaria, along with other childhood infectious diseases, has been found to exacerbate malnutrition (Sachs 2000).

The factors that have led to such an increase have been: resistance of parasites to commonly used anti-malaria drugs; breakdown of control programmes; complex emergencies for example conflict and internally displaced people; collapse of local primary health services; and resistance of mosquito vectors.

The devastating impact of malaria in SSA on human health, particularly vulnerable groups, and its negative effect on economic growth has been acknowledged by both national governments on the continent and by the international community at large. This recognition by both African States and the international community is firmly embedded in both the Abuja declaration on Roll Back Malaria, 2000 and the Millennium Development goals (MDGs), 2000. These plans of action acknowledge the synergies between malaria and socio-economic development and place malaria decisively as a development challenge rather than a simple health issue.

International commitments to tackle malaria

Millennium Development Goals & malaria

In September 2000, the United Nations Millennium Summit endorsed the Millennium Development Goals (MDGs) in what was called the Millennium Declaration. More than one hundred eighty countries were signatories to this declaration. The main objective of the Millennium Summit was to set quantifiable and time bound global development goals to end human suffering from hunger, destitution and diseases mainly in developing countries. Since its inception, MDGs have been embedded in several international and regional initiatives and have continued to increasingly influence policy discourses throughout the developing world. The MDGs constitute 8 goals, 18 targets and 48 indicators that are agreed upon by 180 member states of the United Nations at the Millennium Declaration in 2000 (See Box 2).

Malaria is an important target in Goal 6, to combat HIV/AIDS, malaria and other diseases, which sets the target of halting and reversing prevalence rates by 2015. Besides, malaria control, as has been stated above, is an integral part of a comprehensive development framework with a key role in poverty reduction. Its

predominance and severity in terms of morbidity and mortality in SSA, renders malaria a key challenge in Africa's development.

Box 2

MDGs Endorsed at the Millennium Declaration, September 2000

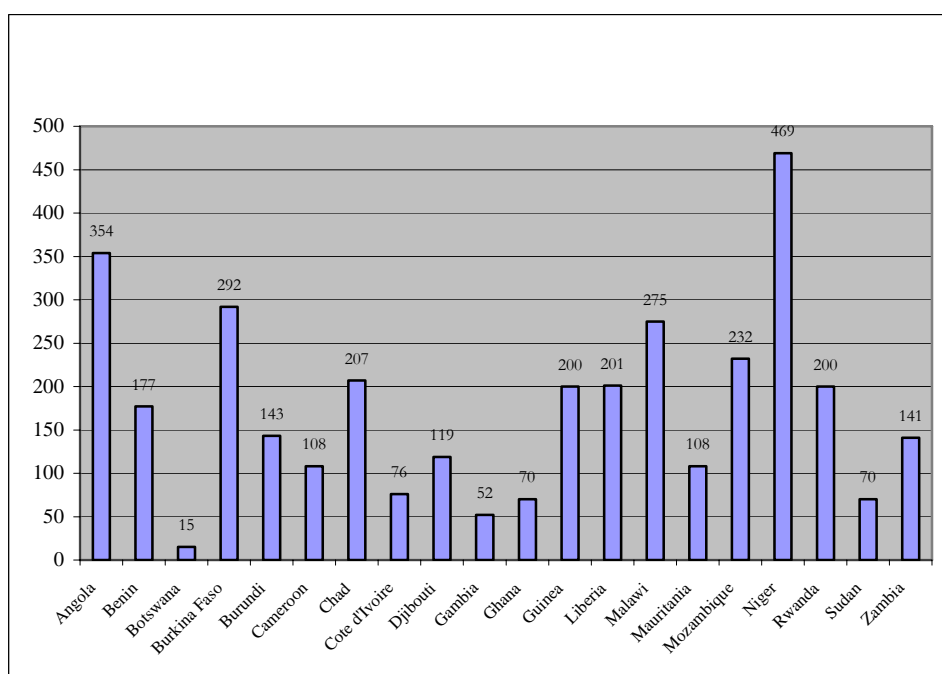
1. Eradicate extreme poverty and hunger
 - Halve the proportion of people with less than dollar a day.
 - Halve the proportion of people who suffer from hunger
2. Achieve universal primary education
 - Ensure boys and girls alike complete primary schooling.
3. Promote gender equality and empower women.
 - Eliminate gender disparity at all levels of education
4. Reduce Child Mortality
 - Reduce by two thirds the under-five mortality rate
5. Improve maternal health
 - Reduce by three quarters the maternal mortality ratio
6. Combat HIV/AIDs, malaria and other diseases
 - Halt and reverse the spread of HIV/AIDs
 - **Halt and reverse the spread of malaria and other major diseases**
7. Ensure environmental sustainability
 - Integrate sustainable development into country policies and reverse loss of environmental resources
 - Halve the proportion of people without access to potable water.
 - By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.
8. Develop a global partnership for development.
 - Develop further an open, rule-based predictable, non-discriminating trading and financial system-commitment to good governance, development, and poverty reduction-both nationally and internationally.
 - Address the special needs of the Least Developed Countries
 - Address the Special Needs of land-locked countries committed to poverty reduction.
 - Deal Comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term.
 - In cooperation with developing countries, develop and implement strategies for decent and productive work for youth.
 - In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

Some trends

In SSA trends between 1990 and 2000 give a mixed picture of progress towards the malaria targets.

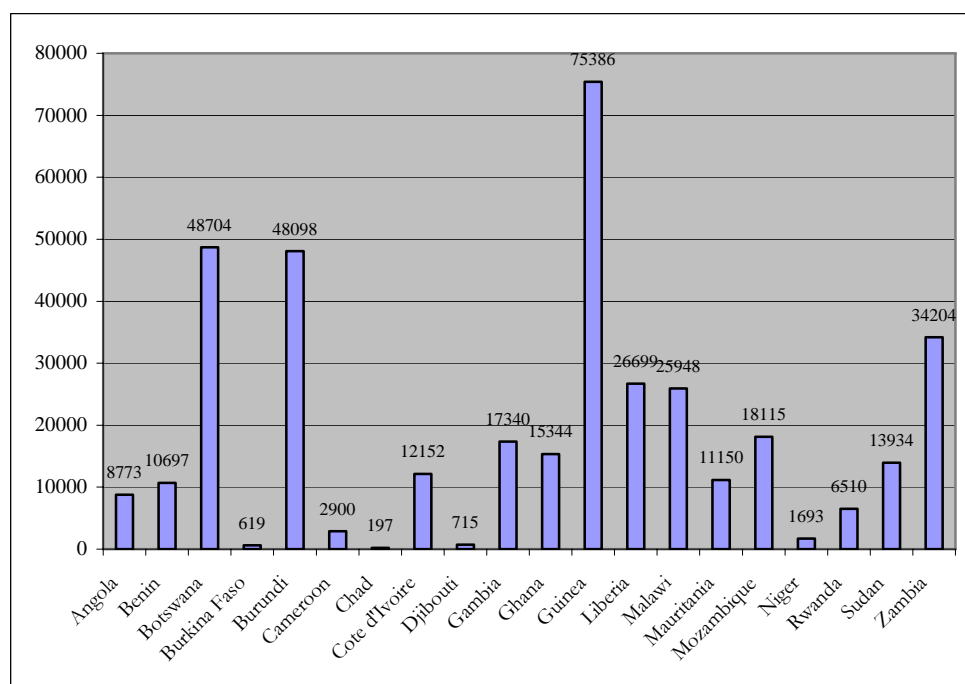
The mortality rate per 100,000 children aged 0-4 years as a result of malaria was 791 in SSA in 2000 while it was only 47 in North Africa. It is severe in West Africa countries such as Burkina Faso, Mali, and Niger where 300-470 deaths had occurred per 100,000 in all ages in 2000 (see figure 2).

Figure 2
Malaria mortality rates in selected SSA countries, 2000



Source: United Nations Database, millennium indicators

Figure 3
Malaria prevalence rates in selected African countries, 2000



Source: United Nations Database, millennium indicators

The prevalence of malaria is also still high in SSA countries reaching as much as three fourth in the case of Guinea (75,386 notified cases per 100,000 population) and nearly half of the population in the case of Burundi and Botswana during the period 1998-2000 (See Figure 3). Fourteen countries of Africa have also greater than 10 percent prevalence rate. It is to be noted that prevalence rate and death rate of malaria are not proportional (a high prevalence rate does not mean a high death rate) due to a difference in prevention and treatment rate among countries.

The malaria epidemic is particularly grave in West Africa. Malaria is endemic in practically the entire sub-region. According to estimates in 2002, the number of malaria cases is very high in most countries. Mortality is predominant mostly among children aged 0-4 years, among whom the prevalence rate is four times higher than the rate for the national population. This high mortality rate among children could persist as long as vigorous measures aiming at prevention and treatment with appropriate medications are not implemented (ECA 2005).

Surprisingly, with this high rate of prevalence of malaria, the prevention practice in SSA is very low. In 1999-2001, it is only in a few countries (Benin, Comoros, Gambia, Guinea-Bissau and Rwanda) where only 5-15 percent of the population aged less than 5 years used insecticide treated bed nets in malaria risk areas and the average for SSA is only 2.1 percent. In West Africa the prevention of the disease at 15 per cent remains very low in the age bracket of 0-5 years. In some countries like Ethiopia and Eritrea only 3-4 percent of the population with fever was being treated with anti malaria drugs in 2000-2002 (ECA 2005).

Synergies across MDGs

There is no doubt that the goals and targets set in the MDGs are linked. There is a strong synergy across the targets in the MDGs so that progress in one target is both a result and cause of progress in others. In fact, at the most basic level, per capita income is a robust predictor of demand for education and health services, which are crucial components to achieve the MDGs. That is, access to basic health and education services explain only a part of the high mortality and low primary enrolment rates in Africa. A significant proportion is also explained by abject poverty. High drop out rates from schools due to bouts of famine and epidemics of diseases related with malnutrition contribute significantly to low primary completion and high child mortality rates. This presents further challenges on adequate policy instruments for tackling targets simultaneously and consequent optimal resource allocation.

Malaria is no exception to the synergies across MDGs. The impact of malaria on the other goals can be divided into three major areas, namely education, health, and income poverty.

Malaria and education

Some of the severe consequences of malaria in children are impairment of cognitive ability, diminished anthropometrical growth and reduced physical ability to engage in schoolwork. This results in children starting school at a later age, poor educational performance, high dropout rates, and an increase in the number of children requiring special education (Chima et al. 2003). As would be expected, the effects on adults are diminished productivity, absenteeism, and unemployment. In addition, teachers with ill health are absent from school for long periods of time. This affects the children's education and leads to overcrowding in classes, lowering the quality and efficiency of an education system that is already burdened with students with special needs, such as orphans experiencing psychological trauma after caring for sick parents.

The MDGs specifically dealing with education (Goal 2 and Goal 3) are thus constrained by the malaria epidemic in SSA. Malaria contributes to loss of human capital by reducing educational outcomes. Furthermore, the "caring" role of girls within the household exacerbates their already inadequate enrolment and completion rates.

Malaria and health

Malaria, besides being an epidemic itself, negatively impacts other health indicators and targets. The MDGs on child and maternal mortality are the immediate health indicators that are negatively affected by malaria. In SSA, malaria accounts for around 20 per cent of deaths of under-5s. This is a small proportion of the total disease burden, estimated at 200-300 million cases that occur among young children in Africa. Furthermore 3 per cent of attacks are characterized as being severe, and 50 per cent of these children die because of inadequate or lack of hospital facilities. Thus malaria prevention and cure would directly impact under 5 mortality. In fact, the insignificant reduction in under 5 mortality (Goal 4) in the period 1990 to 2002 from 186 to 174 per 1,000 live births is seriously off-track². In general, SSA countries have reduced child mortality on average by 10-12 per cent for the last 12 years, but are expected to reduce it in the remaining 13 years (from 2003-2015) by 62-64 per cent from its level in 2002, if the MDGs are to be reached.. Although this rate of progress is rather difficult to achieve, tackling the impact of malaria on children would greatly assist reducing child mortality.

Similarly the negative impact of malaria on maternal mortality trends is significant. The average maternal mortality rate per 100,00 live births for SSA countries, which was 920 in 2000 is practically at the same level as 1990. Of the 49 countries where data is available, 18 countries exhibit e maternal mortality rate of 1,000 per 100,000 live births in 2000 with the highest in Angola, Malawi, Niger, Sierra Leone, and Tanzania (See Box 3). As is the case in the under five mortality rate, North African countries (except Sudan and Mauritania), Cape Verde, Mauritius, and in this case Botswana have the lowest (less than 150) maternal mortality rate. The trend of reduction in most countries of SSA is only between 4-16 percent for the last 10 years while it is expected to reduce it by three-quarters in 2015 from its level in 1990. Furthermore, it has increased by 15 per cent in Southern Africa countries instead of decreasing during the last 10 years.

The contribution of malaria to these grim figures is large. Again, it is an element that aggravates inadequate maternal assistance in SSA countries. Young pregnancies, lack of anti-malarias during pregnancy, and health assistance pre and post- birth are crucial, if maternal mortality rates are to be lowered. For example, in Benin, in 1990, only 38 percent of the births attended by skilled personnel but reached to 66percent in 2002. The same is true for Egypt where it increased by 24 percentage points from its level in 1990 and reached 61 percent in 2002. In Gambia maternal mortality decreased by 40 per cent during the period 1990 to 2000 through targeting access to safe drinking water, that in turn decreased vector borne diseases and placed Gambia on track to achieve the maternal mortality goal (ECA 2005).

² SSA and sub-regional averages are population weighted and 50 African countries are included in the calculation.

Box 3
Malaria-related maternal mortality rates in Mozambique

Mozambique had a maternal mortality rate of 1,000 per 100,000 births in 2000. In the central hospital of Maputo, Mozambique all pregnancy-related maternal deaths were reviewed to establish cause and .

Overall, 15.5 per cent were directly attributed to malaria. 37.8 per cent of these malaria deaths occurred in adolescent primigravidae. In addition the majority were associated with severe anaemia. Furthermore, unregistered deliveries and poor antenatal care were identified as risk factors.

Thus, malaria is one of the risk factors in pregnancies, however its synergic negative impact with inadequate health facilities, renders malaria particularly dangerous to young pregnancies.

Source: Granja et al , 1998

Besides the synergies between malaria and specific health goals, the overall impact of malaria on health systems cannot be underestimated. Public health sectors in most African countries already had difficulty providing basic services to the population before the emergence of HIV/AIDS and the worsening of TB and malaria. This was due both to inadequate resource inputs and inefficient use of available resources. The onslaught of the three diseases on top of this has imposed additional pressure by further overstressing health systems. The three diseases have distorted referral patterns, increased hospital patient loads and bed occupancy rates, and exposed health workers to risk of infection. In particular, malaria poses a similar burden on the health system. The proportion of national health spending on this disease in high-endemic countries is estimated to be around 40 per cent (Malaria Consortium 2002). In these countries, the disease may cause as much as 25-40 per cent of outpatient visits and up to 50 per cent of inpatient admissions (WHO and UNICEF 2003).

Malaria and poverty

Malaria has been called the epidemic of the poor. It is an aspect of ill health that negatively affects adult productivity, and hampers the accumulation of human capital in younger generations.

About 70 per cent of Africa's population is engaged in agriculture, producing food for consumption and income. Ill health from malaria causes a decline in crop output, reduction in inputs, a decrease in area planted, changes in cropping patterns and loss of agricultural knowledge. At the core of the impact on

agriculture is the loss of potential able-bodied adult labour as well as reduction in labour quality, time diverted from agricultural activities towards caring for the sick and attending funerals, and reduced funds to hire seasonal casual labour. In addition, households often sell their capital goods (farm equipment, cattle) in order to get funds for paying for health and funeral expenses.

The impact of ill health on human capital in Africa is overwhelming. Ill health resulting from infectious diseases indiscriminately affects both the skilled and unskilled human resources. The rate of attrition is so high that some countries cannot train new professionals fast enough.

In urban areas malaria also has a big impact on labour-force performance. Malaria reduces work performance by impairing physical ability, causing significant loss of work-life, productive time, income, and savings. Efficiency of the workforce is falling due to high morbidity and mortality caused by repetitive episodes of illnesses in malaria- endemic areas.

The loss of human capital and lower productivity results in a lower economic growth rate. This in turn negatively affects the poor who are stuck in a vicious circle of poverty. Ill health through malaria means lower income due to lower productivity, and this in turn results in lower economic growth and higher poverty. Furthermore, high prevalence rates of malaria among the most vulnerable groups has a double effect of limiting poverty exit strategies, and seriously impedes the accumulation of human capital by these groups.

Abuja roll back malaria

The devastating impact on Africa's development was a spur to political action within the continent. Although the MDGs do recognize the need to tackle diseases in developing countries, African leaders took the initiative to render targets on diseases even more specific, thus enhancing monitorable time bound objectives to be met.

These Declarations³ represent major breakthroughs for several reasons. A worldwide consensus has emerged on the impact of health status on development, with significant emphasis for Africa on HIV/AIDS, TB, and malaria. These Declarations place health at the core of the poverty-alleviation process as well as the development agenda. International partnerships emerged and special funds were set up to support these new Declarations (See Box 4). Most importantly,

³ African leaders as a group were galvanized into action towards control of these diseases as far back as the 1980s, with the 1987 Declaration on Health as a Foundation for Socio-Economic Development; the 1992 Dakar Declaration on the AIDS Epidemic in Africa; the 1994 Tunis Declaration on HIV/AIDS and the Child in Africa; the 1996 Addis Ababa Declaration and the African Plan of Action Concerning the Situation of Women in Africa in the Context of Family Health; and the 1997 Harare Declaration on Malaria Prevention and Control in the Context of African Economic Recovery and Development.

African leaders have increasingly moved away from mere declarations and wish lists towards much more action-oriented and accountable plans of action. This is evidenced by the fact that the Abuja 2000, Abuja 2001, and UNGASS Declarations have developed a set of indicators for monitoring the commitment of governments to these Declarations. These indicators are backed up by specific resource requirements and follow up actions.

In particular, the Organization of African Unity (OAU) Extraordinary Summit on Roll Back Malaria (RBM) in Africa in Abuja, April 2000, achieved great political commitment to the prevention and control of malaria on the continent. In addition, the RBM Partnership that was subsequently initiated provided an opportunity for mobilizing resources to support malaria control activities in member countries. The salient features of the Declaration were: firstly, to improve access to prevention and care, through the reduction or waiver of taxes and tariffs on mosquito nets and materials, insecticides, anti-malarial drugs, and other malaria-related commodities; and secondly, to make use of evidence-based public health interventions for an effective response. These commitments resulted from a greater understanding that strengthening national health systems and undertaking health reforms were necessary. Heads of State endorsed the RBM's goal of halving the prevalence of malaria in the world by 2010 and designated 25 April each year as Africa Malaria Day.

Box 4

African Leaders commitments to tackle malaria

The African Summit on Roll Back Malaria was held in Abuja, Nigeria on the 25th of April 2000. It reflected a real convergence of political momentum, institutional synergy and technical consensus on malaria (and, to some extent, other infectious diseases issues).

By signing the Declaration the African leaders rededicated themselves to the principles and targets of the Harare Declaration of 1997. They committed themselves to an intensive effort to halve the malaria mortality for Africa's people by 2010, through implementing strategies and actions for Roll Back Malaria, as agreed at the Summit. In addition, they agreed:

- to catalyze actions at regional level to ensure implementation, monitoring and management of Roll Back Malaria;
- to initiate actions at country level to provide resources to facilitate realization of RBM objectives;
- to work with partners towards stated targets, ensuring the allocation of necessary resources from private and public sectors and from non-governmental organizations; and
- to create an enabling environment in their countries which will permit increased participation of international partners in malaria control actions. The leaders resolved to initiate appropriate and sustainable action to strengthen the health systems to ensure that by the year 2005:
 - at least 60% of those suffering from malaria have prompt access to, and are able to correctly use, affordable and appropriate treatment within 24 hours of the onset of symptoms,
 - at least 60% of those at risk of malaria, particularly children under five years of age and pregnant women, and benefit from the most suitable combination of personal and community protective measures such as insecticide treated mosquito nets and other interventions which are accessible and affordable to prevent infection and suffering, and
 - at least 60% of all pregnant women who are at risk of malaria, especially those in their first pregnancies, have access to chemoprophylaxis or presumptive intermittent treatment.

Source: OAU 2000

Monitoring framework

In 2004, a report that was a collaborative effort between the Economic Commission For Africa (ECA), the African Union, the Joint United Nations Programme on HIV/AIDS (UNAIDS), and the World Health Organisation (WHO) *Scoring African Leadership for Better Health* was published. This report monitored the Abuja Declaration, 2001 on HIV/AIDS, Tuberculosis and other

infectious diseases. In this report the commitments listed in the Roll Back Malaria Commitment of 2000 was incorporated (ECA 2004).

The monitoring framework was developed around the six areas identified as crucial, namely:

- Bolstering institutional response;
- Strengthening health systems;
- Forging partnerships;
- Mainstreaming health into the development agenda;
- Mobilizing financial resources;
- Investing in research and development.

Trends up to 2001/2002

In the report progress towards the Abuja declarations can be summed up in Figures 4 . The basic interventions to control malaria had been instituted. Thus in 2001/2002 strategic plans had been established in most African countries, environmental management had improved and the use of ITNs as a preventive measure was acknowledged. However, there had been limited progress in building partnerships with the private sector, community-based care was not adhered to, and drug procurement procedures were not in place. In addition, domestic and external resources allocated to malaria control and cure were scarce (ECA 2004). All the 12 countries⁴ analyzed had introduced country strategic plans, and situation analysis on malaria. All 12 countries had introduced a 5-year budget. However, none had extended partnerships with the private sector, improved drug procurement and ITNs, and community based care implementation.

⁴ Burkina Faso, Eritrea, Ethiopia, Ghana, Kenya, Mali, Nigeria, Senegal, Sudan, Togo, Zambia, and Zimbabwe.

Figure 4
Roll Back Malaria Implementation Assessment Matrix 2001

Countries	Country RBM Expansion Strategic Plans Developed	Situation Analysis of Constraints And Gaps Completed	RBM Coverage > 90%	5-Year Budget for RBM Expansion Completed	Extended RBM Partnerships With Private Sector Exists	Improved Drugs and Procurement Procedures to Ensure Uninterrupted Supply in Place	Community-Based Care Implemented
Burkina Faso	Yes	Yes	No	Yes	No	No	No
Eritrea	Yes	Yes	No	Yes	No	No	No
Ethiopia	Yes	Yes	No	Yes	No	No	No
Ghana	Yes	Yes	No	Yes	No	No	No
Kenya	Yes	Yes	No	Yes	No	No	No
Mali	Yes	Yes	No	Yes	No	No	No
Nigeria	Yes	Yes	No	Yes	No	No	No
Senegal	Yes	Yes	No	Yes	No	No	No
Sudan	Yes	Yes	No	Yes	No	No	No
Togo	Yes	Yes	No	Yes	No	No	No
Zambia	Yes	Yes	No	Yes	No	No	No
Zimbabwe	Yes	Yes	No	Yes	No	No	No

Source: WHO 2001, ECA Computations.

In addition, country strategic plans were also aimed at integrating malaria control into national health-sector plans, resource mobilization, and partnerships (WHO 2001). In practice, while Roll Back malaria provided financial resources based on the country strategic plan, this process did not conform to other funding mechanisms for example the Sector-Wide Approaches (SWAP) or the Poverty Reduction Strategy Papers. Thus, it was extremely difficult to mainstream malaria in the development agenda with conflicting procedures and sources of finance.

Domestic resources needed to combat malaria were estimated at least at 15 per cent of national budgets in highly endemic countries. In 2000 many African countries have increased health spending, but most have not met the Abuja target of 15% of the government budget (Figure 4). Only Madagascar, Mauritania, and Tunisia achieved the target. Some countries, such as Tanzania and Zimbabwe, reached the target in 1998 but saw falling allocations by 2000 (WHO 2002).

International contributions to malaria control totaled \$67 million in 1998 and were estimated to have more than doubled to \$130 million in 2002 (Malaria Consortium 2002). Around \$35 million of this came through RBM. Ten African countries (Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Nigeria, Senegal,

Tanzania, Uganda, and Zambia) received a total of \$50 million, around 70% of direct-to-country investments in Africa.

The target set to fight malaria in the Abuja Declaration and Plan of Action (2000) was to allocate “*substantial resources of at least US\$1 billion per year to Roll Back Malaria*” (OAU 2000). This is equivalent to an additional \$0.6 per capita for effective malaria control by the year 2007 and \$0.9 by the year 2015 (WHO 2001b). Given domestic resource constraints in African countries, external funding is crucial in meeting this target. But external funding for malaria control in Africa remains low, at 7 to 8 cents per capita annually (Malaria Consortium 2002b).

Research and development requires high levels of financial investment, particularly for biomedical or basic research. Research findings guide policy development, decision-making, and the design of health programmes that address the unique microbial diversity of tropical Africa. There is a bias in research towards the diseases of the rich and away from those of the poor (WHO 2002b). Malaria accounted for 2.7% of the global disease burden in 2000, with 90% of cases occurring in Africa. But malaria research received only 0.17% of the \$60 billion spent globally on biomedical research (WHO 2001b).

Current trends

Progress, although limited, can be observed in malaria prevention and cure since 2002.

The Abuja Declaration targets a 60 per cent coverage of risk population groups that is not on track, however increased national and international funds have boosted the deployment of ITNs. Over 45 African countries have integrated ITNs as a part of malaria control. Increased national and international funds allocation have boosted the use of ITNs. 50 per cent of African countries have waived taxes and tariffs on netting material and insecticides. Available surveys also indicate that coverage with any net, not insecticide treated, is 10 times higher than ITNs and is more widespread, particularly in West and Central Africa. An interesting development is social marketing and subsidized ITN distribution, within public health facilities in Mali and Senegal (See Box 5). However inequities in ITN coverage persist. ITN ownership by the poorest households is 26 per cent, against 45 per cent by richer households. ITN possession and usage by children under 5 years of age are twofold to threefold lower in rural areas than in urban areas (WHO 2005).

Box 5 ITN coverage increases in West and Central Africa

UNICEF together with the Canadian Government and in coordination with the national ministries of Health began the Accelerated Child Survival and development Initiative in West and Central Africa in 2002.

Poverty indicators higher than national averages and under 5 high mortality rates determined the 92 districts that implemented the programme in Benin, Ghana, Mali and Senegal. This was combined with the immunization programme and antenatal visits to pregnant women. From 2002 to 2004, 4 million ITNs were distributed and retreatment of nets took place.

ITN coverage of children and pregnant women increased from 1 per cent to 46 per cent in Senegal, and from 6 per cent to 71 per cent in Mali. Antenatal visits increased in all countries by 200 per cent.

Source: WHO 2005

In addition, by the end of 2004 23 African countries had adopted Artemisinin-based combination therapy (ACT), and an additional 14 countries are in the process of changing from conventional chloroquine and sulfadoxine to ACT. Chloroquine failures were between 50 to 60 per cent in East and Central Africa, and between 10 to 30 per cent in West and Southern Africa. These current failure rates between 1994 and 2004, confirm chloroquine resistance has spread all over the continent. Thus in order to overcome the ineffectiveness of conventional drugs that the *Plasmodium falciparum* have become resistant to, ACT has been greatly enhanced (WHO 2005).

Home management strategies have been implemented in 22 SSA countries (See Figure 5)⁵. This strengthens primary care and a more efficient decentralized public service delivery. Integrating ITNs to children and pregnant women, ensuring antenatal visits, immunization campaigns, and accessible health clinics form part of this home management. The progress achieved is note worthy, but replication for all SSA malaria endemic countries is crucial.

⁵ The selected countries for an update on the 2001 list are Burkina Faso, CAR, DRC, Eritrea, Ethiopia, Ghana, Kenya, Mali, Nigeria, Senegal, Sudan, Togo, Uganda, Zambia, and Zimbabwe.

Figure 5
Roll Back Malaria Implementation Assessment Matrix 2004

Countries	Country RBM Expansion Strategic Plans Developed	Situation Analysis of Constraints And Gaps Completed	RBM Coverage > 90%	5-Year Budget for RBM Expansion Completed	Extended RBM Partnerships With Private Sector Exists	Improved Drugs and Procurement Procedures to Ensure Uninterrupted Supply in Place	Community-Based Care Implemented
Burkina Faso	Yes	Yes	No	Yes	No	No	Yes
CAR	Yes	Yes	No	Yes	No	Yes	Yes
DRC	Yes	Yes	No	Yes	No	Yes	Yes
Eritrea	Yes	Yes	No	Yes	No	No	Yes
Ethiopia	Yes	Yes	No	Yes	No	No	Yes
Ghana	Yes	Yes	No	Yes	Yes	No	Yes
Kenya	Yes	Yes	No	Yes	No	Yes	Yes
Mali	Yes	Yes	No	Yes	No	Yes	Yes
Nigeria	Yes	Yes	No	Yes	Yes	No	Yes
Senegal	Yes	Yes	No	Yes	No	No	Yes
Sudan	Yes	Yes	No	Yes	No	No	Yes
Togo	Yes	Yes	No	Yes	No	No	Yes
Uganda	Yes	Yes	No	Yes	No	Yes	Yes
Zambia	Yes	Yes	No	Yes	No	No	Yes
Zimbabwe	Yes	Yes	No	Yes	No	No	Yes

Source: WHO 2005, ECA Computations.

Figure 5 gives at a glance the current progress on tackling malaria, compared to the first report Scoring African leadership for better health. There is no doubt that ITN coverage for vulnerable groups has been increased, as has home management. Thus, a shift to preventive measures for malaria –ITNs and community based management- can be seen, but the partnerships with the private sector and resources are still critical areas.

In terms of domestic resource mobilization there was a reversal from 2002 to 2004, on the target of allocating 15 per cent of national budgets to health. Currently Botswana is the only country that meets this target. However, more than 30 per cent of SSA countries have allocated more than 10 per cent. Countries making good progress include Zimbabwe (14.5%); Sao tome and Principe (14%); Tanzania, Gambia, and Ghana (13 %); and Uganda and Namibia (12%). On the contrary, 38 per cent of countries have allocated between 5 to 10 per cent, and 29 per cent of countries have allocated below 5 per cent mostly in West and Central Africa, where the malaria epidemic is the most virulent (AU 2005).

However, resources remain scarce, as have private partnerships. The need to allocate more resources is crucial. External resources are still not coordinated and suffer from predictability and harmonization among donors. In fact of the \$ 1,939 million approved grants of the Global Fund to fight AIDS, Tuberculosis and Malaria only 44 per cent have been disbursed (AU 2005).

The economics of malaria: a clarion call for action

As stated above, malaria control has been increasingly recognized as an integral part of a comprehensive development framework. The perceived risk of infection has been suggested to negatively affect decisions related to trade, investment, risk adverse behaviour in crop choices and agricultural techniques.

In the decades following the Global malaria Eradication Programme (1955-69) the geographic range of the disease contracted substantially to the tropical areas and political commitment and resources allocated for malaria control and research dwindled (UN 2005a). In addition, since the 80s and 90s the spread of resistance to conventional anti-malaria medicines, and a general weakening of health systems have exacerbated the malaria conundrum. This has tended to equate malaria as “location or destiny” specific to Sub-Saharan Africa. Malaria is intimately connected to poverty, although ecology and climate are contributors to its high morbidity and mortality rates.

Box 6

Elimination of malaria: Greece a clear example

In Greece malaria in the 40s and 50s affected 25 per cent of the population. The use of DDT (insecticide) had spectacular results with malaria cases falling from 1-2 million a year in the 1930s to only 5,000 in the 50s.

The economic growth that Greece had in the 60s and 70s enhanced this eradication campaign, where higher incomes led to better sanitation and water management. Higher incomes also led to higher school enrolments and better health in general. There was an overall increase in well being that contributed to sustaining the eradication campaign.

Source: Sachs 2000.

Malaria’s link to poverty is ultimately a link to economic growth. In the period 1980s to late 1990s low economic growth in Sub-Saharan Africa has led to rather static features in poverty levels and this has further exacerbated malaria negative impact (ECA 2005).

Health has both direct and indirect effects on a country's economy. The direct effect is through the impact of ill health on current productivity. The indirect effects of malaria on a country's economy are via the size and quality of the labour force as determined by such factors as mortality, morbidity, fertility and intellectual capacity (Mills & Shullcutt 2004). This is not the same as saying that malaria causes lower economic growth. What the literature seems to portray is that malaria exacerbates poverty and is a contributing factor to lower economic growth.

The direct growth effects of malaria contribute to losses in both the volume and productivity of outputs. Malaria incapacitates part of the labour force. Studies have shown that attacks, depending on the severity, typically entail a loss of 4 working days, followed by additional days with reduced capacity (A good review can be found in Brohult et al 1981; Picard and Mills 1992; Hempel and Najera 1996). In addition, the malaria transmission season generally coincides with that of planting and harvesting. As a result, malaria induces changes in planting patterns to minimize the overlap between malaria episodes and peak agricultural work. This in turn reduces agricultural productivity, income losses, and deepening the impoverishment of rural agricultural households. For example a recent survey in the rural Bukabo district in Tanzania found a radical shift in the allocation of labour time a woman with a sick husband spends 60% less time on agricultural activities than she would normally (ILO 2000). Another example is a 1993 study on Sudan that showed a total of 8,409 labour hours were lost due to malaria during the farming season. Farmers caring for the sick lost 1,332 labour hours, and 1,307 labour hours were lost due to incapacitation (Bollinger et al 1999).

Box 7

Agricultural losses in Zambia due to ill-health

In Zambia, households without a ill head of household planted on average 22 per cent more area in 2002-3 than in the previous year. This is further exacerbated by income quintiles.

The well –off, but ill household heads in Zambia cultivated only 1 per cent less area in 2002-3, relative to 2001-2. However poor households the decline in cultivated area was nearly 70 per cent. This has worrisome implications for the long-term viability of rural farming systems, as ill health-affected poor households are at risk of losing land, farm implements, and livestock. It would push them into deeper poverty.

Source: ECA 2004

In addition, these direct effects are augmented by more indirect links between malaria and productivity. Frequent absenteeism reduces the efficiency of networks, requiring greater redundancy and reducing the scope for specialization.

Malaria limits intra- and international labour mobility, thus reducing the quality of skill matching (ECA 2004).

Overall loss in economic growth through the impact of malaria has been quantified as 1.3 per cent yearly. A 10 per cent reduction in malaria was associated with a 0.3 per cent increase in economic growth (McCarthy et al 2000).

Furthermore, the economic cost-benefit analysis of tackling malaria point towards a necessary and fruitful investment. The cost of reaching the goal of halting and reversing the malaria epidemic in the developing world has been estimated at \$21 per capita per year (UN 2005). Thus, for over a billion people at risk the total cost would be \$140 billion over the period 2002-2015. The benefits estimated over the same period have been estimated at between \$275 and \$660 billion. This means a benefit/ cost ratio of 1.9 or 4.7 in tackling malaria (Mills & Shullcutt 2004).

From a microeconomic point of view, prevention and cure of malaria cause a considerable burden for households. For example in Malawi total annual cost of malaria for an average household was calculated at \$40 per year, 7 per cent of total income. Similar figures have been found in Kenya, total cost 9-18 per cent of income and 7-13 per cent in Nigeria (Mills & Shullcutt 2004). In fact, considering the three components of the Millennium Project over the period 2002-15, the estimated benefits are:

- An increase in ITNs by under 5s in SSA, from the present 3-5 per cent to 70 per cent would provide a benefit of nearly \$18 billion at a cost of \$1.77 billion.
- Providing a two-stage anti-malaria treatment to 90 per cent of women in their first pregnancy would protect 5 million mothers at a cost of \$0.5 billion, while delivering benefits of \$6.2 billion, a benefit/cost ratio of 12.1
- Changing to ART, many African countries have done so after 2003, would cost \$6.5 billion, while delivering benefits of \$251 billion. In addition to halve malaria incidence an additional 112 million cases would increase costs by \$8.2 billion and benefits computed would be an additional \$158 billion. In effect, a benefit/cost ratio of 19.1 (Mills & Shullcutt 2004)

Estimates suggest that interventions to tackle malaria generate benefits that far outstrip costs. The benefits to human welfare are matched by economic gains. Furthermore, the impact of health spending is immediate and does not suffer from time-lag aspects as in education (Deaton 1993).

Conclusions and recommendations

Malaria ranks among the major health problems facing Sub-Saharan Africa. Tackling malaria requires significant financial and organizational resources. However, malaria restrains economic growth and health investments in general and in malaria in particular produce a high rate of return. It is the benefits of higher economic growth, combined with a healthy, and therefore more productive, current and future African population that render investments into malaria control necessary, and viable.

The progress in SSA countries made since 2002/2003 is noteworthy, however more needs to be done. The areas that still require priority, remaining within the critical areas listed in the monitoring framework, are:

Scaling-up interventions in malaria control

More attention should be given to programmes targeted at the most vulnerable groups. Interventions aimed at children and pregnant women are highly effective. Pooling resources through partnerships is one way to expand services. For example, in June 2002 five countries (Kenya, Malawi, Tanzania, Uganda, and Zambia) launched the Malaria in Pregnancy Coalition for East and Southern Africa (MIPESA). The Coalition represents a unique, concerted effort to accelerate the prevention and control of malaria (UNAIDS and WHO 2001).

Another challenge is to improve the response to epidemics following heavy rainfall, droughts, or conflicts. Malaria-detection and warning systems need to be put in place so that data are collected and analyzed in a routine manner for the early detection of epidemics. In order to utilize resources most effectively in emergency situations, preparation and coordination of activities between relevant organizations are vital. Selective use of Dichloro-Diphenyl-Trichloroethane (DDT), especially for outdoor spraying, is another recommended option for preventing epidemics. This should be carried out along with other environmental management activities, such as improvement of homestead hygiene.

Insecticide-treated nets (ITNs) have proven an effective public health tool for protection against mosquito bites. This benefit could be enhanced if bed nets were provided free to vulnerable groups. The use of ITNs by children reduces the risk of dying from malaria by at least 20% (Roll Back Malaria 2002). Although ITNs distribution has improved since 2000, this must be accelerated further and replicated in all Sub-saharan countries.

Reinforcing health systems

The distribution of ITNs, and ACTs require a network of functional health facilities. In order to meet the increasing demand for such services, the rehabilitation of dilapidated facilities is essential.

Innovative approaches can reduce the need for new laboratories and health facilities in limited-resource settings. The home based community management of malaria needs to be stepped up. The best example cases of Ghana and Togo of combining vaccination campaigns with ITN distribution are noteworthy and could be replicated. Furthermore, health systems across the continent lack trained medical personnel. Mismatched skills and the unequal geographical distribution of healthcare personnel undermine the efficient functioning of health systems.

The technical capacity of the medical sector must be strengthened. Training programmes need to be scaled up and training by employment category needs to match demand. To achieve this, education and curricula need to be reformed in line with current and future needs.

Shifting Government strategy

African governments need to redefine their roles to be more focused. In particular, governments need to focus on other health-related variables that may exacerbate the spread of epidemics. Another important area is the regulation of private sector participation in providing health services. While encouraging private sector participation, it is the responsibility of governments to set up adequate regulatory structures that would monitor private sector activities and ensure that these are in line with broader national health strategies. Introducing and enforcing anti-discriminatory legislation are another key aspect of government responsibility.

Furthermore, with rates of immunizable diseases still high, water-related illnesses on the rise, and poor housing conditions, ill health will remain prevalent across Africa. Simple, inexpensive measures can make an enormous difference to a nation's health status. Health interventions can only be successful if accompanied by minimum standards in sanitation and nutrition. These include provision of safe drinking water, improving personal and homestead hygiene, meeting nutritional requirements, enforcing housing policies, and carrying out immunization campaigns (World Bank 1993). Re-focusing on the basics also means that health spending must be allocated according to disease burden.

Forging partnerships

The successful implementation of leadership commitments depends on the cooperation of all stakeholders. The main responsibility for monitoring the national response lies with governments. However, governments need to be

informed and supported by public action fostered through partnerships. Such partnerships have proven extremely useful in advocacy, education, and consensus building among stakeholders. The potential of community-based associations is not fully realized in Africa, partly due to their limited voice in decision-making processes. It is recommended that governments expand their support to local associations by acknowledging their role in combating epidemics, making room for these organizations in policy making, and providing financial resources, education, and training. The active participation of civil society should start at the early stages of devising national strategies and continue until the final evaluation. To promote synergies, governments need to ensure that all nongovernmental organizations work within national strategic frameworks.

Mobilizing financial resources

The promotion of ACTs in many African countries is an important step in a more efficient malaria control programme. However, ACTs are costlier than conventional drug therapy, and therefore resources needs are higher. It is imperative that the 15 per cent budget allocation to health is adhered to. The reversals from 3 countries in 2001 to 1 country in 2004 are definitely not a step in the right direction. This pledge and a more efficient domestic resource use is crucial.

Most health systems cater to urban areas, neglecting remote, rural regions. In most developing countries, major urban hospitals receive about two-thirds of the government health budget, despite serving just 10 to 20% of the population (WHO 2000).

The Tanzania Essential Health Interventions Project provides a best-practice example of efficient expenditure allocation. In Morogoro and Rufiji, two rural districts, surveys were carried out to compute the burden of disease and it was found that the amount spent by local authorities bore no relation to the disease burden of the district. Malaria accounted for 30% of life lost in Morogoro, but received only 5% of the health budget. To rectify the situation, the authorities increased health spending by \$0.80 per head and distributed funding according to the disease burden. The results were immediate, with infant-mortality rates falling by 28% between 1999 and 2000, and under-5 mortality rates dropping by 14% in Rufiji (Economist 2002). Although this is a pilot project, it has a lot of potential. Apart from increasing spending efficiency and tackling diseases effectively, the project managed to develop successful partnerships, with a substantial part of the project financed by the Canadian International Development Agency.

Many African countries rely on aid for funding health programmes and consequently donors play a significant role in health-sector resource allocation and decisions. Nonetheless, both the quantity and the quality of development assistance raise questions. Aid quantity has declined over the years, and aid quality

has not improved significantly. Aid quality is low. The unpredictability and excessive conditionality attached to development assistance are major constraints to effective interventions against disease in Africa.

The unpredictability of aid is widespread in Africa as donors too frequently make unilateral changes in aid agreements without consulting the recipient countries. In countries that depend on aid to fund large amounts of government spending, such as Mozambique (where aid accounts for 70% of the budget), Rwanda (60%), Uganda (50%), and Ghana (40%), the timely availability of donor contribution is critical (ECA 2003). Unpredictability results in serious disruption to national programmes and creates uncertainty about how to plan for the future. There is a danger in starting a long-term programme with only short-term resources. This concern applies, for example, the Global Fund resources that are provided for up to five years. It is often the case in externally supported programmes that no strategy is planned in advance to ensure the sustainability of the project when the period of support ends.

Conditionality is another serious impediment to the mobilization of financial resources. Many African countries receive assistance to the same sector from several partners, with each partner imposing their own conditionality and extensive reporting requirements. Already limited public-service resources are overstretched in fulfilling these donor requirements. This results in high transaction costs for recipient countries. Reducing such costs requires improving donor coordination and harmonizing development assistance programmes.

Research and development

Much breakthrough research is taking place in medicines, diagnostics, and vaccines for malaria. These developments hold great promise for enhancing treatment strategies. However, African countries face many challenges in taking advantage of these advances and making high-impact interventions widely available. Undertaking R&D in health goods and services is a long and costly process. The efficient use of newly available medical technologies and treatments is hampered by the predominance of weak and inefficient health systems in Africa. The bias of medical research towards high-profit products and the lack of coordination between existing research programmes and stakeholders add to the list of challenges. Nonetheless, Africa cannot afford to neglect R&D. It is necessary for African countries to invest strategically in R&D in order to get the maximum benefits out of limited resources. This can be done through:

- Promoting research partnerships
- Focusing on applied research
- Strengthening domestic regulation
- Supporting and lobbying for international legislation beneficial to Africa.

Bibliography

African Union (2005) *Progress Report on the Implementation of the plans of Action of the Abuja declarations on HIV/AIDS, TB, Malaria.*

Bollinger L., J. Stover, and E. Seyoum. 1999. "The Economic Impact of AIDS in Ethiopia." The POLICY Project. The Futures Group International in collaboration with Research Triangle Institute (RTI) and the Center for Development and Population Activities (CEDPA), Washington, D.C.

Chima, R.I., C.A. Goodman, and A. Mills. 2003. "The Economic Impact of Malaria in Africa: A Critical View of the Evidence." *Health Policy and Planning* 63: 17-36.

- Deaton A (1993) *Intertemporal choice and inequality*, World Bank, Washington.
- Filmer.D (2002) Fever and its treatment among the More and less poor in Sub-Saharan Africa, *Policy research Working paper 2789*, World Bank, Washington.
- I.L.O.(2000) *Modelling the Impact of HIV/AIDS on Social Security*. Geneva.
- Korenromp. EL (2003) “Measurement of trends in childhood malaria in Africa: an assessment of progress towards targets based on verbal autopsy”, *Lancet Infectious Diseases*, 3(6); 349-358.
- Malaria Consortium. 2002. “Final Report of the External Evaluation of Roll Back Malaria Achieving Impact: Roll Back Malaria in the Next Phase.” Liverpool School of Tropical Medicine, Liverpool.
- Mills.A, S.Shillcutt (2004) The challenge of communicable diseases, *Copenhagen Consensus Paper*.
- OAU (Organization of African Unity). 2000. *The Abuja Declaration on Roll Back Malaria in Africa*. African Summit on Roll Back Malaria, April 25, 2000, Abuja.
- Rowe A (2005) The burden of malaria mortality among African children in the year 2000, W.H.O., Geneva.
- Sachs J, J. Gallup (2000) The Economic Burden of Malaria, *CID Working paper No 52*, Harvard University.
- U.N.E.C.A. (2004) *Scoring african Leadership for Better health*, Nairobi.
- U.N.E.C.A. (2005) *Achieving the MDGs in Africa*, mimeo, Addis Ababa.
- Unit4ed nations (2005a) *Coming to grips with malaria in the new millennium*, New York.
- United Nations (2005b) Investing in development a practical plan to Achieve the Millennium development Goals, New York.
- W.H.O.(2001b). *World Health Report 2001*. Geneva.
- WHO (World Health Organization) and UNICEF (United Nations Children’s Fund). . (2005) World malaria report, Geneva.
- WHO (World Health Organization) and UNICEF (United Nations Children’s Fund). 2003. *The Africa Malaria Report 2003*. Geneva.

