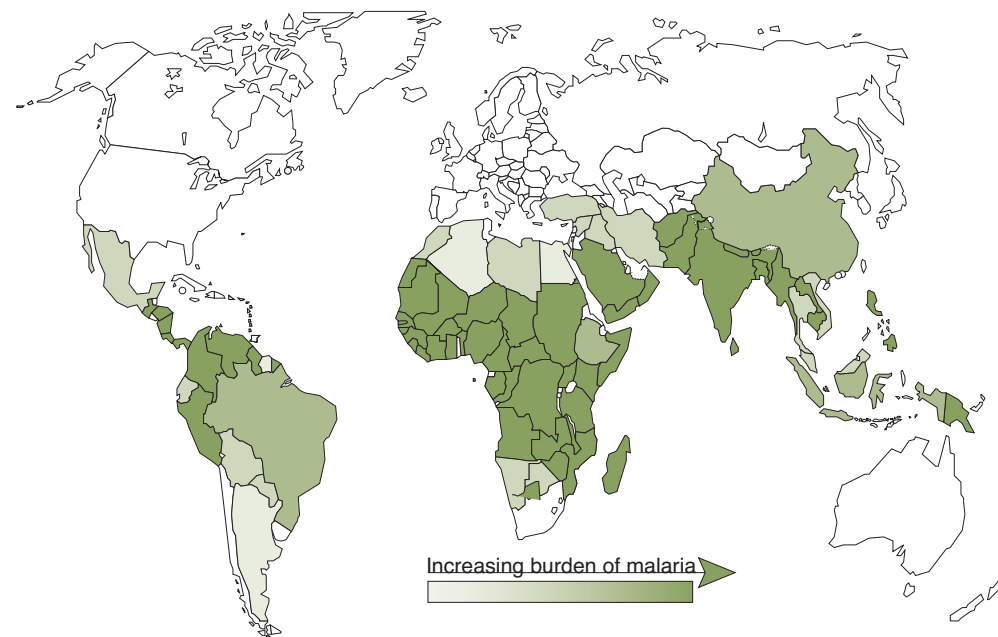
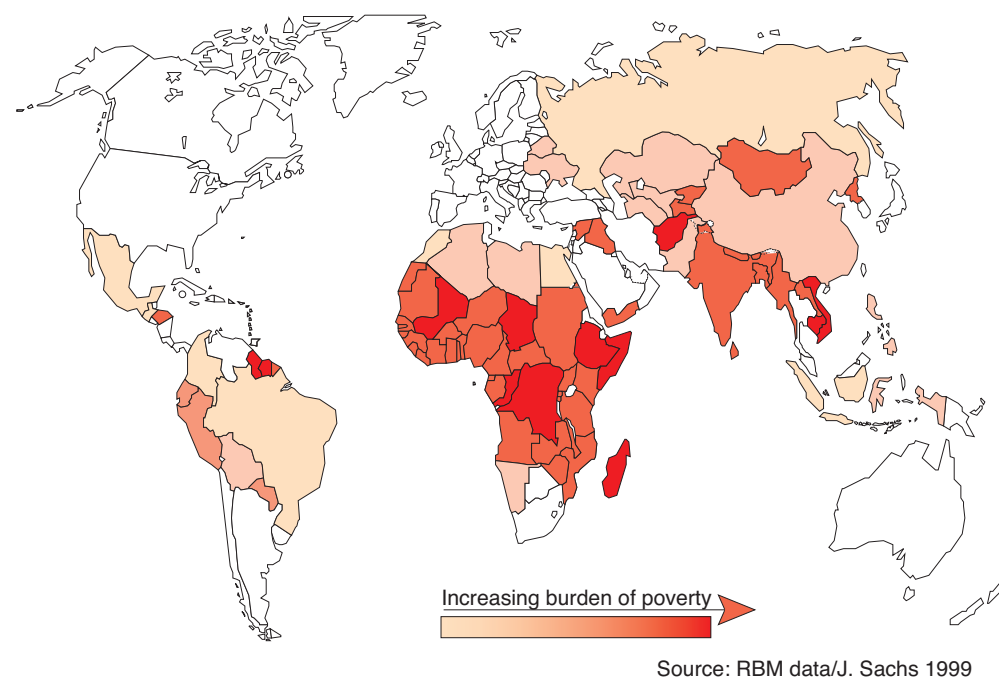


## Estimate of world malaria burden



## Estimate of world poverty



The Startling Correlation between Malaria and Poverty



# Tackle Malaria Today

## Give tomorrow a Chance



House of Commons  
All-Party Parliamentary Malaria Group



House of Commons  
All-Party Parliamentary Malaria Group

## Tackle Malaria Today: a call to the international community

Britain's proposals for an international initiative to build a strong and prosperous Africa are doomed to struggle unless they tackle the continent's burden of malaria. The United Kingdom, in its presidencies of the G8 and the European Union, must take the lead in securing long-term commitment to a scaled-up global effort to fight malaria. This investment will also produce excellent returns in terms of health and economic benefits, as malaria control is one of the most cost-effective public health interventions known.

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**Sponsors:** Roll Back Malaria Partnership Secretariat, Malaria R&D Alliance, Multilateral Initiative on Malaria

## Foreword

Malaria is the world's number one killer disease which is both preventable and curable. There is not one of us who can turn a blind eye to the cause of highlighting and bearing down on malaria, particularly where it strikes hardest – Africa. This comprehensive and authoritative report makes an important contribution in bringing this challenge and opportunity to the top of public consciousness across the globe.

Having been born in Mtwara in Tanzania, I returned last year for the first time in 45 years as part of the Commonwealth Parliamentary Association delegation to Tanzania. I was struck by how much the lives of people of all ages and situations in Africa could be transformed for the better if the battle against malaria was given a new focus, with the vision and the resources to tackle this genuinely avoidable scourge. As British Parliamentarians with long and deep care for the peoples of the developing world, not least in Africa, the All-Party Parliamentary Malaria Group was established last year, which I have been privileged to Chair. Our first objective was to establish, through a series of frequent public meetings with presentations from experts, the authoritative information base about malaria today – what is actually happening on the ground in terms of the spread of disease and its effect on local communities, the current programme of treatment and prevention, current and prospective resources being made available, and the opportunity for development of new tools such as better and cheaper drugs and vaccines. The All-Party Group has been gratified by the level of response by many members of the scientific, academic, charitable and support communities and the representations from both the public and private sectors, as evidenced by the attendance in the House of Commons at each of our All-Party Group presentations and evidence sessions. These have now been brought together in this report to be submitted to the British Government – to underpin the intent of all of us in Britain who wish to see and support Government action, irrespective of party politics, to re-energise and boost the understanding, plan of action and the resources for combating malaria.

Whilst thanking all those who have given their time and energies in compiling this report, I commend this report to all those who wish to see malaria at the top of the agenda for action to be taken by the British Government and the British people to help move towards the new purchase on life which a renewed commitment to tackling the scourge of malaria will give for the benefit of all – whether in the developing nations or elsewhere.

*Stephen O'Brien MP*

## Executive Summary

“Malaria traps countries in a vicious cycle of poverty and ill health. Progress by African countries in expanding their economies and reducing poverty over the past decade is now endangered by a failure to use our collective knowledge, wisdom and resources to bring essential medical advances to bear for the benefit of all our citizens.”

*Dr Pascoal Mocumbi, former Prime Minister of Mozambique*

Malaria has over millennia changed the course of geopolitics and military campaigns. Unless it is now tackled head-on, the disease risks jeopardising the international community's proposed initiatives to lift Africa out of poverty, and build a strong and prosperous continent. Africa is currently at the top of the global agenda, and a major plank of Britain's year-long presidencies of both the European Union and the Group of Eight rich nations (G8). On the table are proposals to provide debt relief for the poorest countries, ease protectionist trade barriers, and create a fund, the International Finance Facility, which would raise up to US\$ 50 billion annually in aid.

But the enormous benefits promised by these new initiatives risk being compromised by the sheer scale of the human and economic burden of malaria in Africa. The 17-member international Commission for Africa, created to address the challenges facing the continent, acknowledged in its report, published in March 2005, that controlling malaria is critical to social and economic progress.<sup>1</sup>

This report of the All-Party Parliamentary Malaria Group complements the Commission for Africa's work, and expands in greater detail on how to respond to the challenge of malaria. It concludes that to have a chance of success, any new initiative for Africa must be accompanied by a massive and sustained science-based and operationally practical scale up of efforts to stamp out malaria on the continent.

**“ Malaria is the biggest single killer of African children, and half those deaths could be avoided if their parents had access to diagnosis and drugs that cost not much more than US\$1 a dose. ”**

Malaria is of course a global problem, but it wreaks its worst havoc in Africa. **The majority of the 1 to 3 million people that malaria kills each year live in Africa, where the disease is the biggest killer of children under five years old.** Worldwide, some 300 to 600 million people are infected with malaria, and nearly half the planet lives in regions where the whine of a mosquito can herald terrible suffering and even death.

Malaria affects six out of the eight targets of the United Nations Millennium Development Goals (MDGs).<sup>2</sup> Target 6 is a commitment to halt and reverse the incidence of malaria by 2015. The goal of the Roll Back Malaria initiative – launched in 1998 by the World Health

Organization (WHO), the World Bank, the United Nations Development Programme (UNDP) and UNICEF, is to halve deaths due to malaria by 2010. However, the burden of malaria may be increasing, not decreasing, and these goals are far from being met.

### Tackling Malaria to Achieve the Millennium Development Goals (MDGs)

- **Eradicate Extreme Poverty (MDG 1)**  
Malaria is intricately linked to poverty, consuming up to 25% of household incomes and 40% of government health spending. It costs Africa US\$12 billion per year in lost GDP.
- **Achieve Universal Primary Education (MDG 2)**  
Malaria, a leading cause of illness and absenteeism in children and teachers, impairs attendance and learning.
- **Reduce Child Mortality (MDG 4)**  
Malaria is the leading cause of child mortality in Africa, accounting for 20% of all child deaths.
- **Improve Maternal Health (MDG 5)**  
Malaria is four times more likely to strike pregnant women than other adults, and has life-threatening implications for both mother and child.
- **Combat HIV/AIDS, Malaria and Other Diseases (MDG 6)**  
Malaria control will reduce morbidity and mortality caused not only by malaria but also by other diseases.
- **Develop a Global Partnership for Development (MDG 8)**  
Public-private partnerships are currently working on improving access to anti-malarial drugs. Such efforts can serve as a basis for improving access to other essential medicines. Partnerships are also developing new tools to tackle malaria.

Why are so many people ill and dying from malaria when effective tools are available to control it? Malaria is completely treatable using drugs. Mosquito nets and insecticides can also protect people from mosquito bites. But these tools are not getting to those who need them.

**Determined action by the international community, sustained over decades, is now needed. This would involve scaling up integrated control programmes over entire regions, and combining the best weapons we have – drugs, insecticide treated mosquito nets, and house spraying – in a science-based strike to both prevent and control malaria. In parallel, a major hike in investment in research to develop new and better drugs and other tools is essential.**

**“ The global malaria crisis is desperate and worsening, particularly in sub-Saharan Africa. Unless we find ways to control this devastating disease, efforts to reduce poverty, minimise childhood mortality, increase security and strengthen the most vulnerable societies, will fail. ”<sup>3</sup>**

The biggest obstacle to progress at present is not a shortage of science, but a paucity of political will to deal with malaria. Compared with AIDS, for example, malaria is neglected by politicians, researchers, drug companies, activists and the media.

<sup>1</sup> *Our Common Interest*. Report of the Commission for Africa, released on 11 March 2005. (<http://www.commissionforafrica.org/english/report/thereport/cfafullreport.pdf>)

<sup>2</sup> <http://www.developmentgoals.org>

<sup>3</sup> Klausner R, Alonso P. An attack on all fronts. *Nature*, 2004, 430: 930-931.

The Commission for Africa notes that: “malaria is the biggest single killer of African children, and half those deaths could be avoided if their parents had access to diagnosis and drugs that cost not much more than US\$ 1 a dose.” The World Bank estimates that malaria alone slows African economies by 1.3% per year – a 32% reduction in African gross domestic product (GDP) over 35 years. Malaria, concludes the bank, costs African economies US\$ 12 billion annually.<sup>4</sup>

Yet despite malaria's devastating toll, funding for malaria control by international donors has typically amounted to just US\$ 100–200 million annually.

At least US\$ 2–3 billion each year is needed to make any serious impact on malaria. This figure may seem large, but according to the UN Millennium Project's Task Force on Malaria<sup>5</sup> – that's the equivalent of just 2–3 days' worth of US and European Union farm subsidies. At the same time, the Task Force identified malaria as a “quick-win” opportunity where “very modest investments could lead to enormous breakthroughs in human well-being and economic development.” **Malaria control is an excellent investment in development, giving exceptional economic and health returns.**

The world has repeatedly, and with much fanfare, pledged to spectacular targets for reducing the malaria burden. This in fact will never be met with the current level of commitment and funding. The international community now has an opportunity and a duty to reduce the malaria burden, boost the economies of African countries, and improve global health.

**“ The biggest obstacle to progress at present is not a shortage of knowledge about how to deal with malaria, but a paucity of political will to put this knowledge into practice. ”**

The All-Party Parliamentary Malaria Group has provided a forum where parliamentarians and the many organisations working in malaria have come together and found a new and united voice to deal with this complex disease. There is a groundswell of support to tackle the problem, but actual strong political commitment coupled with the required resources is still missing. A wide range of public health partners have agreed to a strategy elaborated in the Roll Back Malaria (RBM) Partnership Global Strategic Plan 2005–2015 (section 2.1).

Tony Blair once described the neglect of Africa as a “scar on the conscience of the world.” Britain's presidency this year of the G8 and the European Union, provides a window of opportunity for it to lead the international community in establishing a global coalition to define and implement a massively scaled-up and well planned long-term international programme to heal the “sore of malaria in Africa.”

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<sup>4</sup> <http://tinyurl.com/5mx5n>

<sup>5</sup> Coming to grips with malaria in the new Millennium. Draft final Report of the Millennium Project Task Force 5 Working Group on Malaria, August 2004. Coordinators: Burton H. Singer, Awash Teklehaimanot.

# 1. Why malaria must be tackled now

## 1.1 The scale and impact of the malaria pandemic

“Grace Malenga’s frustration comes through loud and clear: Come the first rains, after a week or so, my wards are flooded by sick, convulsing or anaemic kids – a good proportion of whom die, year in, year out. What preventative measures will it take to reverse that?”

As a paediatrician and director of the Malaria Alert Centre in Blantyre, Malawi, Malenga finds that decades of medical progress and international effort have changed little for those in the front line of the war against malaria.

Blantyre is surrounded by tea fields, forested slopes and some of the most striking mountains in Malawi; but during the rains from November to March, malaria turns this region into killing fields. Its sad claim to fame is the international Blantyre Coma Scale, invented here in 1987, which rates the clinical severity of malaria in children.”<sup>6</sup>

Similar shocking scenes of sickness and death play out every day across the tropics and subtropics, in dramas that raw statistics cannot capture. Worldwide, malaria kills somewhere between 1 and 3 million people every year – several times as many as died in the genocide in Rwanda. Some 300 to 600 million people are ill with malaria, and about 2.4 billion people – almost half of humanity – are at risk.

The vast majority of those killed by malaria live in Africa.

In most of Asia and Latin America, the malaria situation is much better than it was 50 years ago, although malaria remains a major problem in some places. Much progress was made during WHO-coordinated global campaigns in the two decades from the mid-fifties onwards – the “eradication era” – mainly by attacking the vector *Anopheles* mosquitoes with insecticide sprayed on the walls of houses.

### 1.1.1 Malaria makes a comeback

Malaria is resurging in many regions, in particular in the former Soviet countries of central Asia, where it had been eliminated or sharply reduced during these campaigns. Malaria control slipped off the international agenda from the 1970s onwards. As a result, donor funding collapsed, and malaria control programmes were scaled back or abandoned, expertise was lost, and health systems allowed to degrade.

### Every year malaria causes:

- up to 3 million deaths
- up to 600 million attacks of acute illness
- up to 400,000 episodes of severe anaemia in pregnancy
- up to 300,000 low-birth-weight babies
- up to 50,000 cases of neurological damage

Important progress has been achieved more recently, for example in China, Thailand and Vietnam, through sustained application of carefully coordinated control strategies. But those gains are now also under threat. Both in Africa and south-east Asia, doctors and families have for decades been dependent on cheap but effective drugs such as chloroquine and sulfadoxine/pyrimethamine as the mainstay of malaria control. However, these old drugs are now useless in many places because the most dangerous malaria parasite, *Plasmodium falciparum*, has grown resistant to them.

The malaria parasite now shows high levels of resistance to almost all affordable drugs in many areas. This raises a nightmare scenario where malaria could become untreatable. Urgent action is needed both to preserve the effectiveness of existing drugs and to discover and develop new ones.

### 1.1.2 Why is malaria so rife in Africa, and who is most vulnerable?

While the rainfall and temperature in many tropical areas are ideal for mosquito breeding, it is mainly Africa that happens to be the home of the world’s most efficient and deadly malaria vector, the mosquito *Anopheles gambiae*. It also has a long lifespan and a preference for human blood.

To these grim realities, one can add crumbling of health services which is due partly to the HIV pandemic but mainly to the fact that most African governments are now poorer, and have less to spend on health than 20 years ago. Spiralling resistance of the *Plasmodium* parasite to chloroquine, a cheap drug that has been the mainstay of malaria control in Africa, has seen deaths in parts of the continent multiply dramatically in the past few years.

## Measuring malaria

It is not easy to estimate the exact amount of death and disease due to malaria. Only a minority of cases report to official clinics. Health facilities are often too far away, leaving people to treat themselves as best they can using drugs from shops. Diagnosis of malaria is often uncertain because most cases lack specific signs and symptoms, and many people have both malaria and other diseases. Because of this unavoidable uncertainty, official estimates of the numbers of cases and deaths attributable specifically to malaria are often revised, and are usually expressed as a range.

New estimates of the number of cases of illness due to malaria have recently been published by a group of researchers<sup>7</sup> (300–660 million cases per year caused by *Plasmodium falciparum*, the deadliest form of malaria) and by the World Health Organization<sup>8</sup> (350–500 million cases per year of all forms).

These new reports are consistent with older estimates in finding that the vast majority of cases occur in Africa, but they show that the number of cases in Asia has been substantially underestimated in previous official estimates.

As a measure of the overall burden of malaria, reliable estimates of deaths due to malaria are even more important than counts of cases, and international groups of researchers are now preparing new estimates of malaria mortality. It is important to continue to refine estimates in order to measure progress in combating malaria, but whether there are 300 million or half a billion cases a year, there are far too many, given that there are effective ways available to control it.

<sup>6</sup> Butler D. Power to the People. *Nature*, 2004, 430: 928–929.

<sup>7</sup> Snow RW, Guerra CA, Noor AM, Myint HY & Hay SI. *Nature*, 2005, 434: 214–217.

<sup>8</sup> <http://mosquito.who.int/rbmdepartment>

The poorest populations are most at risk, and the severe form of the disease most often strikes young children, women who lose their acquired immunity to malaria during pregnancy, and people who lack any immunity to the disease, such as refugees and migrant workers moving into malaria-endemic zones from areas where there is little malaria. On a national scale, malaria is the most common cause of inpatient admissions and outpatient attendances in most African countries.

In many rural areas of sub-Saharan Africa, malaria transmission is intense. Almost everyone is infected almost all of the time in these areas, and are constantly exposed to re-infection. Children catch malaria for the first time well before their first birthday, and suffer repeated bouts of illness as they grow up. Left untreated, these bouts often become severe, and are too often fatal.

Why are children so vulnerable, with under-fives accounting for almost 90% of deaths due to malaria? Older children and adults in these high transmission areas acquire a partial immunity to malaria through repeated exposure to the parasite (from infected mosquitoes) over a period of time, and develop only milder forms of the disease. However, younger children lack this immunity. Those who survive initial infections live to acquire partial immunity later in childhood.

In sub-Saharan Africa, one out of six infants will never reach his or her fifth birthday. Malaria accounts for almost one fifth of these deaths, and is often a greater killer of African children than diarrhoea, respiratory disease or HIV/AIDS. As well as causing sickness and death of children, malaria is also thought to have a significant negative impact on intellectual development, with 50,000 new cases per year of direct neurological damage caused by cerebral malaria infection.

Another vulnerable group is pregnant women who, especially with their first child, lose their acquired partial immunity to malaria. The damage caused by malaria during pregnancy is thought to account for 200,000 deaths of infants and 35% of babies with preventable low birth weight. Malaria also causes almost half a million episodes of severe anaemia in pregnancy, and an estimated 10,000 maternal deaths per year.

### The human cost of malaria: Fever Road

Fever Road tells the story of Peter Kombo, Chief of Kiagware village in the Kisii highlands, Kenya, as he battles through the malaria season. Many of his villagers, particularly the young, are dangerously ill and Chief Kombo struggles to get more help for them from the local authorities.

Unable to afford transport to their district hospital, the people of Kiagware turn instead to local herbalists and to quacks – untrained doctors – to treat them. These quacks can wrongly prescribe Western drugs, sometimes with fatal consequences. Chief Kombo is faced with a deadly dilemma: stop the quacks from treating the villagers and leave his people no hope at all, or allow them to continue and risk more deaths. The desperate case of the Mauti family highlights just how difficult Chief Kombo's task is. Touched by their plight, he borrows money to pay for their son Walter to be taken to hospital. It comes just in time, as one more day without treatment could have cost Walter's life. But as Chief Kombo points out, he cannot pay for everyone in the village, and not long after Walter returns from hospital he has malaria again.

*Synopsis of a BBC film directed by Kevin Hull, Films of Record for BBC/PBS*

## 1.2 Future trajectory of the malaria pandemic

If a coordinated attack on malaria is not forthcoming, the pandemic will worsen in most of sub-Saharan Africa, parts of south and central Asia and the poorer regions of south-east Asia. Drug-resistant malaria will drive much of this deterioration. Drug-resistant malaria, thought to have originated in south-east Asia, has spread inexorably across Africa, Asia and South America over the past four decades. Its impact is greatest in Africa and in parts of Asia, especially where the deterioration of health infrastructure has exacerbated the effects of inadequate treatment.

Parasites in south-east Asia are now resistant to almost all antimalarial drugs, with the exception of drug combinations containing derivatives of artemisinin (artemisinin-based combination therapy, or ACT). These provide fast and effective treatment. But given the speed with which drug resistance has arisen to other drug families, there is a strong possibility that resistance to artemisinin derivatives, or to the companion drugs with which they are prescribed, will inevitably occur in the future.

### Artemisinin combination drugs: 'last line of defence' against malaria

In some parts of the world, the malaria parasite now shows high levels of resistance to almost all available drugs except for one group, artemisinin-based combination therapy (ACT). This raises the disastrous scenario that malaria could become untreatable. Urgent action is needed both to preserve the effectiveness of existing drugs and to discover and develop new ones.

A three-day course of ACT – a combination of a derivative of artemisinin, which is extracted from a Chinese herb, with a second different drug – costing less than £2, cures more than 90% of patients with non-severe malaria. Compared with antiretrovirals for AIDS, **ACTs are cheap, but they are nonetheless beyond the means of the families most at risk of malaria, and in particular, the poorest populations.** ACT's £2 price tag is unaffordable to many when compared with the price of about ten pence for existing and widely available drugs.

Artemisinin and its derivatives artesunate and artemether, have revolutionised treatment in south-east Asia, especially when combined as ACTs. Many countries in Africa are now also switching to this class of drugs, despite their higher costs. If the cost is passed on to the sick, however, these drugs will be unaffordable by all but the rich.

Resistance will almost inevitably catch up with artemisinin derivatives at some point in the future, but the use of two different drugs as a combination should greatly reduce the risk of resistance developing quickly. Given that it could take over a decade to take leads for new drugs through development and clinical trials to market, we urgently need to prime the drug pipeline now with new classes of molecules that will be less susceptible to resistance, more effective and more affordable.

Research is also needed to know how best to use artemisinins, so that they are both effective and affordable. Artemisinins are extracted from a plant, *Artemisia*, which, at present, is cultivated mainly in China and south-east Asia. This provides a supply sufficient for the Asian market but not nearly enough to supply Africa as well. However, the plant could be cultivated widely in Africa to give a high yield of the drug.

Given that it takes well over a decade to take leads for new drugs through clinical trials to market, we urgently need to prime the drug pipeline now with new classes of molecules that will be less susceptible to resistance than drugs already in use. The mission of the Medicines for Malaria Venture (MMV) in 1999 is to rapidly discover and develop new drugs through effective public-private partnerships has been a key step towards this goal, but it remains under-funded.

In sub-Saharan Africa, and in particular in East Africa, the problem of drug resistance is even more acute with the malaria parasites having become resistant to all widely-available drugs. At present many, if not most, people are treated with drugs which are increasingly ineffective, resulting in more people, particularly vulnerable groups such as young children, going on to develop severe malaria and die. Treatment failures are steadily rising across much of the continent, reaching catastrophic levels on the East African seaboard. Every member of a family may get malaria many times a year. With households dependent on an income of just a few pounds per month, even if the cost of a single dose of treatment is as low as £ 1, it is still unaffordable.

The HIV/AIDS pandemic has compounded the problem of drug resistance in particular in southern and central Africa. The large numbers of people sick and dying from AIDS has overwhelmed hospitals and other health facilities, and stretched already meagre health budgets. Many of the key trained personnel are themselves falling victim to HIV/AIDS.

**“ Drug-resistant malaria, originating in south-east Asia, has spread inexorably across Africa, Asia and South America over the past four decades. ”**

Insecticides are a vital part of malaria control, whether sprayed on house walls or used to treat mosquito nets. But insecticide-resistant mosquitoes are also a growing problem. In many places, for example, the main mosquito vectors *Anopheles gambiae* and *A. funestus* are developing resistance to the pyrethroid group of insecticides used with mosquito nets. Insecticide resistance is outpacing the appearance of new insecticides, making investment in research to discover and deploy new safe insecticides a priority. Without this, mosquito control will be steadily undermined.

Similar to drugs, the research and development (R&D) investment in new insecticides to prevent a disease that predominantly affects poor people is simply not attractive to industrial companies as the returns are too low to offset the development costs. This failure in the market system needs to be countered by public funding, and by creating incentives to stimulate R&D.

### 1.3 The economic impact of malaria

In addition to its toll on health, malaria also damages the economies and the social fabric of entire nations. The per capita gross domestic product (GDP) of nations shows a strong correlation between malaria and poverty, and countries where malaria is endemic have lower economic growth rates than those that are free of the disease.

Productivity is hit directly by the millions of workdays lost to illness. More indirectly, malaria negatively affects the size and quality of the workforce, for example, in terms of mortality and intellectual capacity.

The economies of countries with high incidences of malaria grew 1.3% less annually than unaffected countries from 1965 to 1990, resulting in an income level 32% lower than that of countries without malaria – a 10% reduction in malaria was associated with a 0.3% increase in annual growth. In Ghana, a 1% increase in malaria has been found to reduce growth in GDP by an even greater amount – 0.41% – thereby trapping the world’s poorest in a cycle of poverty and illness.<sup>9</sup>

Governments often spend up to 20% of their health budgets on treating malaria. Malaria prevention and treatment is also a considerable burden on households. In Malawi, malaria is estimated to cost the average household US\$ 40 per year, or more than 7% of income. Malaria is a big budget item for families across the continent, accounting for 7–13% of income in Nigeria, and 9–18% in Kenya. As all too often, the burden falls hardest on the poorest populations.

#### Malaria control: an ‘excellent investment’

Cost-benefit analyses unanimously conclude that malaria control is one of the most effective means to improve health, reduce poverty and boost the economic performance of malaria-endemic countries. The catch is that governments and individuals in these countries cannot afford the upfront investment needed to introduce comprehensive malaria control programmes and achieve these benefits. International aid is an effective means of bridging this gap.

Cost-benefit analyses compare the cost of a policy with its benefits. Macroeconomic studies of the impact on economic growth of halving the malaria burden in sub-Saharan Africa by 2015, show that the return was 2 to 4 times the sum invested in malaria control – a very favourable return on investment.

Another study compared the cost of a package of malaria control measures with the number of lives saved as a result. Applying a very conservative monetary value to lives saved – assuming a year of life is worth a year’s national income per head – total benefits were estimated at US\$ 14 billion per year, for an annual investment of US\$ 824 million in a package of malaria control measures. This gives an incredibly attractive benefit ratio of 17.

Many recommended malaria control interventions have a mean cost per Disability-Adjusted Life Year (DALY) of less than US\$ 50 and most of them less than US\$ 25 which economists consider highly attractive in a very low-income country.<sup>10</sup> As judged by the expert panel of the Copenhagen Consensus,<sup>11</sup> these are stunningly attractive investments. This panel of distinguished economists ranked controlling malaria as one of the top four global priorities that would yield the largest benefit/cost ratio.

Malaria also hits poor families by taking up the time of the mother and other family members who must look after children who are unwell. Illness often results in missed school days both by sick children, and brothers and sisters who must stay at home to look after them. The disease also causes direct impairment of learning capacity.

<sup>9</sup> Asante FA, Asenso-Okyere K, d’Almeida S, Mwabu G, Okorosobo T. *Communicable Disease Bulletin for the African Region*, 2: 1–4, World Health Organization Regional Office for Africa, December 2004.

<sup>10</sup> Goodman CA, Coleman PG, Mills AJ. Cost-effectiveness of malaria control in sub-Saharan Africa. *The Lancet*, 1999, 354: 378–385.

<sup>11</sup> Mills AJ, Shillcutt S. (2004) Challenge Paper on Communicable Diseases, Copenhagen Consensus.



**“ Malaria treatment is a big budget item for families across the continent, accounting for 7–13% of income in Nigeria, and 9–18% in Kenya. ”**

It is only recently that economists have been convinced that disease causes poverty, and that public health improvement can substantially boost a nation's economic performance. The WHO Commission on Macroeconomics and Health supported this view strongly in a landmark 2001 report.<sup>12</sup>

Substantial improvements in public health are widely considered to have accounted for almost half of the growth in gross domestic product in East Asia between 1965 and 1990. This, argue some analysts, means that public health measures accounted for at least as much economic growth as did innovation and expansion in goods and services.

### Recommendation

**This report's principal finding is that the huge burden of malaria worldwide can be reduced.** Malaria is a killer disease, whose importance, until recently, was neglected. It is a major cause of poverty and a heavy burden on already vulnerable national economies.

Malaria can be cured and prevented. **We have the tools, but creating efficient and sustainable systems to deliver these tools to where they are needed requires substantially increased investment by the international community.**

The case for a massive and sustained increase in investment in malaria control is reiterated and argued throughout this report.

The biggest obstacle to progress at present is not a shortage of knowledge, but a paucity of political determination to deal with malaria. **Above all, funding must be maintained over decades, if progress is to be sustained. History teaches us that temporary enthusiasm for malaria control, without long-term commitment, is a recipe for failure and disillusionment. The “boom-and-bust” approach to malaria funding is perhaps the biggest obstacle to progress.** Determined action by the international community, sustained over decades, is now needed. This must involve scaling up integrated control programmes over entire regions, combining the best weapons we have – drugs, insecticide treated mosquito nets, and house spraying. In parallel, a major hike in investment in R&D is essential in order to improve the effectiveness of our delivery systems and to develop new and better drugs and other tools for the future.

The 17-member international Commission for Africa created to address the challenges facing Africa, acknowledged in its report, published in March 2005, that controlling malaria is critical to social and economic progress.<sup>13</sup>

This All-Party Parliamentary Malaria Group report complements the Commission for Africa's work, and expands in greater detail on how to respond to the challenge of malaria. It concludes that to have a chance of success, any new initiative for Africa must be accompanied by a massive and sustained science-based and operationally practical scale up of efforts to stamp out malaria on the continent. The international community can, with relatively modest levels of investment, radically improve the health and wealth of the poorest in Africa and elsewhere.

<sup>12</sup> <http://www.who.int/macrohealth/background/en>

<sup>13</sup> *Our Common Interest*. Report of the Commission for Africa, released on 11 March 2005 (<http://www.commissionforafrica.org/english/report/thereport/cfafullreport.pdf>)

## 2. Responding to the crisis: the case for global commitment and funding

### 2.1 The international community's response to malaria

The past few years have witnessed a resurgence of the international community's interest in malaria, after the disease languished in obscurity for more than two decades.

This resurgence in interest in malaria has been prompted, in particular, by the rapid escalation of the disease in sub-Saharan Africa, where, in some parts, deaths from malaria have multiplied in the past few years as a result of mushrooming resistance of the parasite to the most widely used drugs.

Global health thinking has also swung away from the once predominant belief that general primary health care combined with environmental sanitation is enough, and that specific disease control efforts are unnecessary. Awareness grew during the 1990s that progress in global health was impossible without tackling the neglected killer diseases, such as malaria. This movement was encouraged by research showing that interventions against malaria resulted in steep reductions in child mortality.

Testifying to this new momentum, two movements emerged and grew. Firstly, ministries of health throughout the malaria-affected world met, with support from the World Health Organization (WHO), to develop regional strategies, resulting in the Global Malaria Control Strategy launched in 1992 and followed in 1997 by the Harare Declaration of the Organisation of African Unity (now the African Union) to accelerate implementation of malaria control in Africa. Research agencies and donors met with scientists in Dakar, Senegal, in 1997 to explore ways forward for malaria research. This led to the creation of the Multilateral Initiative on Malaria, which aims to train African scientists and to bridge the divides between bench researchers and field workers, and between scientists from the developed and the developing world.

In 1998, Gro Harlem Brundtland, Director-General of the World Health Organization, added political momentum by launching Roll Back Malaria (RBM), a global partnership, backed by the World Bank, the United Nations Development Programme (UNDP) and UNICEF, and now supported by 90 partners. The initiative, in which the UK was the lead investor, has the ambitious goal of halving deaths from the disease by 2010.

A major thrust of RBM has been to promote the need to develop partnerships to broaden involvement in malaria control beyond government programmes by engaging the private, non-governmental and community sectors. In this way, it hopes to exploit broader opportunities to control malaria at the national level and to coordinate disparate resources around agreed strategies. In other words, it recognises that sustained delivery of effective malaria control interventions to everyone at risk will be a massive challenge, and in most countries it is unlikely to be achieved by either the public sector or the private sector acting alone.

RBM was criticised for having spent too long in its early years in discussion rather than action on the ground. An external review of RBM in 2002 concluded that RBM needed a structural overhaul to create opportunities for partners to work together more effectively and be accountable to a governing body.

A pivotal achievement of RBM's early advocacy was the inclusion of malaria in the multibillion dollar Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), created by the G8 countries in July 2001. This inclusion has opened doors to taking malaria seriously by making funds available to countries for implementation on a scale that has never been achieved before. But international efforts are still too small and short-term. What is needed now is to capitalise on growing international interest by channelling this into a massive scale up of improved efforts to control malaria.

The Roll Back Malaria Partnership published its Global Strategic Plan in May 2005. This represents consensus on the way forward to scale up malaria control and recommends a mix of strategies to guide countries and partners in their global effort (see Box below). However, without a commensurate scale up of resources, this global strategy may remain on the shelf.

The targets of the RBM Global Strategic Plan are:

By 2010:

- 80% of people at risk of contracting malaria are protected by locally appropriate vector control methods;
- 80% of malaria patients are diagnosed and treated with effective antimalarial medicines, such as artemisinin-based combination therapy (ACT), within one day of the onset of illness;
- 80% of pregnant women in areas of stable transmission receive Intermittent Preventive Treatment (IPT);
- malaria burden is reduced by 50% in comparison with 2000.

By 2015:

- malaria morbidity and mortality is reduced by 75% in comparison with 2005, not only by national aggregate but also particularly among the lowest socioeconomic quintiles;
- malaria-related MDGs are achieved, not only by national aggregate but also particularly among the lowest socioeconomic quintiles;
- there is universal and equitable coverage with effective interventions.

Funds still fall well short of the estimated billions of dollars (US\$ 2.3 billion per year – US\$ 1.8 billion for Africa and US\$ 500 million for other areas) needed to achieve the goals. Fears that current commitments may not be sustained are in the minds of many malaria control programme managers. There is, however, a new level of optimism with malaria being higher on the global public agenda.

### Roll Back Malaria Partnership Global Strategic Plan 2005–2015 <sup>14</sup>

In 2005, the Roll Back Malaria (RBM) Partnership launched a Global Strategic Plan as a call to action and a source of practical guidance to those already involved, or those interested in becoming involved, in implementation, support or evaluation of the RBM Partnership. The plan sets out what needs to be done over the next ten years if we are to achieve the malaria related Millennium Development Goals by 2015.

**Mission:** To work together to enable sustained delivery and use of the most effective curative and preventive interventions by those suffering most from malaria, by promoting increased investment in health systems and incorporation of malaria control into all relevant multisectoral activities.

<sup>14</sup>The Global Strategic Plan will shortly be found at [www.rbm.who.int](http://www.rbm.who.int)

**Targets:** see section 2.1.

**Strategic approach:** to intensify the implementation of interventions proven to have an impact on mortality and morbidity, with a concurrent focus on improving access to the poorest population groups as well as on going to scale. The guiding principles of the approach are to achieve equity, affordability and sustainability through an outcome-oriented and multisectoral approach.

The strategy promotes both short-term scaling up of interventions and long-term delivery strategies to reach the poorest and sustain high coverage. It advocates for greatly increased investment in malaria control as part of increased investments in health. It requires the coordinated efforts of a partnership of public sector, private sector and civil society, bringing their complementary strengths to comprehensively tackle the problem of malaria in an effective manner.

**Priorities:**

- 1) To ensure that costs are not a barrier for the poor and vulnerable, the RBM Partnership supports free or highly subsidised access to curative and preventive interventions for those groups.
- 2) Significant investment must be made in monitoring, especially to enable tracking of equitable coverage and access.
- 3) Actively seek out and engage private sector and civil society groups, including them into all phases of scaled-up malaria control efforts.
- 4) Greatly expand investment in research to obtain the strong evidence base needed to put into place the most effective and appropriate national policies and practices.
- 5) Stronger emphasis given to community based advocacy and social mobilisation, as a vital process to increase demand and use for interventions.

**Focus: achieving results**

- Rapid increase in coverage with essential interventions in the short term through optimal use of local capacity, increased technical support, and increased financing of malaria control programmes.
- Intensified development of local capacity and health systems to ensure that short-term gains are sustained.

For both of these approaches, the sustained mobilisation of the necessary financial resources is fundamental.

## 2.2 Rolling out the most effective treatments

Malaria is curable. Children who die of malaria die despite the existence of drugs costing less than £ 1 for a course. Most deaths occur because patients do not receive treatment, or are treated too late. Others have their illness incorrectly diagnosed, or are given drugs that are no longer effective because of drug resistance. Each of these deaths is an avoidable tragedy.

Highly effective means of preventing, diagnosing and treating malaria exist, and the challenge now is to ensure that these are delivered to those who need them.

### 2.2.1 Improving the diagnosis of malaria

The fever symptoms of malaria are very similar to those caused by other illnesses, and misdiagnosis is rife worldwide. Many of those with malaria are never diagnosed, or diagnosed with another disease, and this leads to avoidable mortality. With a good microscope, a properly trained technician can use stains to show the malaria parasite on a single blood slide

from the patient, and make an accurate diagnosis. Unfortunately, microscopes are lacking, bottles of stains degrade under poor conditions, and training and working conditions are sub-standard.

Where capacities for diagnosis are inadequate, anyone with fever may be treated as having malaria. Many children and adults treated with antimalarial drugs in Africa do not have the disease, leading to wastage, while such blanket use of drugs can promote drug resistance. This was tolerable when antimalarial drugs were cheap and abundant. It is increasingly untenable as newer drugs cost 10–30 times as much as the older drugs which have now succumbed to resistance. Moreover, current shortages of these drugs are resulting in a dire crisis in many areas, leaving many with no access at all to effective treatment.

**“ Many of those with malaria are never diagnosed, or diagnosed with another disease, and this leads to avoidable mortality. ”**

Making basic microscopy resources more widely available is key to accurate and effective treatment, and represents money well spent as microscopes can also be used to diagnose tuberculosis and many other diseases common in malaria-endemic regions. Despite this, the issue of diagnosis has been neglected as a low priority.

New rapid diagnostic tests, akin to pregnancy tests (except that blood has to be used) have been introduced. They are very useful in particular settings, such as in emergencies and epidemics, but microscopy will continue to play an important role for the foreseeable future. Where malaria transmission is extremely high, detecting parasites in the blood is not very useful, as most people will already have them, even if they are not ill.

### 2.2.2 Drugs for treating malaria

The most effective current drugs against malaria are combinations of two or more drugs, of which the ones recommended by WHO are artemisinin-based combination therapies (ACTs) [see Box, page 5]. A three-day course costs less than £ 2 for adults and less than £ 1 for children, curing more than 90% of patients with non-severe malaria within 3 days. But until recently donors have shrunk from promoting artemisinin-based combination therapy, largely because it costs at least ten times more than established malaria treatments. However, a global switch to ACT is now underway in response to the growing resistance of malaria to existing drugs, and to growing confidence by ministries of health that the international community will commit to supporting the cost.

The Geneva-based Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) acknowledges the general consensus that substantial subsidies for malaria combination drugs, especially ACTs, will be needed for the foreseeable future, until prices are brought down through competition, better technologies and cheaper production methods, and / or until cheaper alternatives are available. Meanwhile, such subsidies are very cost effective when taking into consideration their enormous public health and economic impact.

Compared with antiretrovirals for AIDS, ACTs are cheap, but they are nonetheless beyond the means of the families most at risk of malaria, and in particular the poorest populations. The poorest will likely to go without, or delay treatment until malaria is severe, with often fatal consequences for the child. Malaria can kill within 48 hours. Their alternative is to buy cheaper drugs which are likely to be useless because of resistance.

For subsidies to succeed they must be sustainable. A “boom-and-bust” approach, where donors sometimes subsidise drugs and sometimes do not, would be a recipe for disaster, in particular now that African countries are switching to policies using drugs that they cannot afford on their own. If the subsidy is suddenly cut off it will cause chaos and many deaths. Planning has to be for the long term. Subsidised drugs also need to be made available beyond formal government programmes. The private sector is responsible for much antimalarial coverage, and it is essential that all outlets which prescribe antimalarial drugs, including the drug shops and private pharmacies, provide those that are both affordable and effective.

One key to reducing the cost of artemisinins will be by diversifying supply. Artemisinins are extracted from a plant, *Artemisia*, which is cultivated mainly in China and south-east Asia. This provides a supply sufficient for the Asian market, but not nearly enough for Africa. However, the plant is easy to grow in many parts of the world, and could be cultivated widely in Africa, with a potentially high yield of the drug, which varies according to the climate and different strains. Diversifying supply would not only guarantee better supply but would also drive competition and reduce prices.

Investment in industrial plant to extract the drug is also needed. Industrialisation is high-risk and needs planning and supporting. Competition in the production of ACTs is very limited at present.

**“ Compared with antiretrovirals for AIDS, ACTs are cheap, but they are nonetheless beyond the means of the families most at risk of malaria, and in particular the poorest populations – their £ 2 price-tag compares with about ten pence for existing widely used drugs. ”**

Another solution being explored is to develop synthetic versions of the drug, as this would free industrial production from the vagaries of cultivation of the plant from which it is extracted. The synthetic alternative should also overcome the short shelf-life and high cost of natural artemisinins, allowing cheaper production and formulations that last longer in the field. One promising synthetic candidate, that mimics the working mechanism of artemisinin, has recently been published<sup>15</sup> and is now in clinical trials in Thailand. If it works, it will probably be another four years before it can be deployed; and perhaps more years until it is widely available to most of the population in endemic areas. Investment in increasing existing artemisinin production will be needed to supply the market for many years.

However, as Brian Greenwood from the London School of Hygiene and Tropical Medicine has pointed out: “Relying on treatment as the mainstay of control is an admission of defeat: the failure to prevent infection in the first place. Better prevention strategies must be the goal.”<sup>16</sup>

### 2.2.3 Drugs for prevention

As well as using drugs to treat malaria, two new methods of using drugs for prevention hold out substantial promise for reducing morbidity and mortality in pregnant women and infants.

**“ Relying on treatment as the mainstay of control is an admission of defeat: the failure to prevent infection in the first place. Better prevention strategies must be the goal. ”**

<sup>15</sup> <http://www.nature.com/news/2004/040816/full/040816-7.html>

<sup>16</sup> Greenwood D. *Nature*, 2004, 430: 926–927.

Intermittent preventive treatment in pregnancy (IPTp) is the provision of two or more treatment doses to pregnant women in high-risk areas, and has been shown to reduce anaemia in the mother and prevent low-birth-weight babies, who are more likely to die. It has proved popular with policy makers and is now the officially recommended policy for the prevention of malaria in pregnancy in endemic areas of Africa where levels of transmission are high or medium.<sup>17</sup> One important strength of IPTp is the opportunity to link this malaria control tool with ongoing routine antenatal care.

Intermittent preventive treatment in infants (IPTi) is a strategy under development where infants are given antimalarial drugs three times during the first year of life at the time of routine immunisations at 2, 3 and 9 months, whether they have malaria or not. The key advantage of this approach is that it can be delivered through routine immunisation systems, which in some African countries are still achieving high and equitable coverage.

**“ Using drugs to prevent malaria in infants could become a major tool for malaria control in Africa. ”**

Two studies in Tanzania<sup>18</sup> have shown that intermittent preventive treatment reduces malaria and anaemia in the first year of life by up to 60%. Moreover, intermittent malaria treatment in the first year of life did not compromise malaria immunity, or result in a rebound effect. Intermittent treatment is also likely to have only a minor effect on the rate of development of resistance because it uses small doses. In addition, because it reduces the number of sick children, fewer drugs are subsequently needed for treatment.

Potentially, IPTi could therefore become a major tool for malaria control in Africa. However, before this is clear there is a need to replicate these results in settings where the age-pattern of disease and death from malaria is different from that in the Tanzanian sites studied; and to address a number of additional considerations.

To test, as quickly as possible, this promising new control technique on a large scale, leading malaria research centres in Africa, Europe, and the United States, backed by two United Nations agencies, last year established the IPTi Consortium. Its creation was underwritten by a commitment of US\$ 28 million from the Bill and Melinda Gates Foundation.

## 2.3 Rolling out effective protection from mosquitoes

### 2.3.1 Insecticide Treated Nets

One remarkably effective and cheap prevention tool against malaria is mosquito nets coated with pyrethroid insecticides.<sup>19</sup> These can cut mortality from all causes among children under five by one-fifth for sustained periods.<sup>20</sup> Insecticide treated nets (ITNs) are a remarkably cost-effective intervention, comparable with the best childhood vaccines, in terms of “dollars per death prevented”.

<sup>17</sup> A Strategic Framework for Malaria Prevention and Control During Pregnancy in the African Region. WHO Regional Office for Africa, 2004.

<sup>18</sup> Schellenberg D et al. (2001), Massaga JJ et al. (2003).

<sup>19</sup> The pyrethroids are approved by WHO as being safe for use on nets. They are based on natural plant products, have relatively low levels of toxicity to man, and are rapidly broken down both in living tissue and in the environment, and therefore do not accumulate in food chains.

<sup>20</sup> Lengeler C. *Cochrane Database System Review*. Issue 2, CD000363 (2004).

Although the treated nets, invented in the 1980s, are cheap and effective, fewer than 2% of Africans sleep under them because of their costs, difficulties in distributing them to remote areas, and lack of information on their benefits. Ordinary untreated mosquito nets are much more commonly used and widely available. In 2000, the vast majority of the nets used in Africa were untreated nets bought from commercial suppliers without any public health subsidy or support. These also help to prevent malaria, but are much less effective than treated nets. Massive campaigns are urgently needed to expand the availability and use of treated nets.

Meeting in Abuja in 2000, senior delegates, including 19 heads of state from 44 African countries, signed up to the Roll Back Malaria target, that 60% of vulnerable groups – under-five children and pregnant women – should be using insecticide treated nets by 2005. Most countries are far from meeting that target, however, except Eritrea, Malawi, Tanzania and Togo, which seem likely to achieve, or come close to achieving it.

After a period of debate about the best way to increase and sustain ITN coverage, there is now a broad consensus about strategies and priorities. It is now widely recognised that some distribution systems are good for producing a rapid increase in coverage, while others are more sustainable. In most countries, no single distribution system is likely, on its own, to rapidly achieve public health goals and to sustain them in the long run. A combination of strategies is therefore needed. It is agreed that giving insecticide treated bednets to the most vulnerable groups, free of charge (or perhaps at a “virtually free” token price), is an indispensable component of this mix. Good use can also be made of existing distribution systems. This means not only using existing public health antenatal and immunisation services to provide subsidised access to pregnant women and infants, but also using existing commercial distribution systems that sell unsubsidised locally-made untreated nets. These are generally well-established and responsive to demand.

**“ Insecticide treated nets can cut mortality among children under five by one-fifth for sustained periods. They are a remarkably cost-effective intervention, comparable with the best childhood vaccines in terms of ‘dollars per death prevented’. ”**

The key question concerning access to ITN is how to ensure that subsidies successfully reach the poor and most vulnerable, and are not diverted for the benefit of the better-off. More broadly, how can we balance the need for a rapid and massive short-term increase in coverage, against the long-term advantages of locally-integrated systems that would provide better sustainability?

### **Insecticide treated mosquito nets versus house spraying**

The jury is still out on the respective benefits and cost-effectiveness in Africa of insecticide treated mosquito nets versus spraying of the interior walls of houses, with both methods being effective.

The choice between the two depends not only on short-term epidemiological impact, but also on feasibility and sustainability in the long term and at a large scale, as well as the availability of appropriate delivery systems. For example, in some countries in southern Africa and in the Horn of Africa, large sections of the population are at little

or no risk of malaria, and others are exposed to unstable or epidemic malaria. In these circumstances, house spraying has some important advantages: it has rapid and reliable short-term impact, and it can be targeted to the communities at highest risk on an annual basis and in response to changing transmission patterns.

Spraying is, on the other hand, relatively demanding in terms of the logistics, infrastructure, skills, planning systems and the coverage levels that are needed for a successful and effective operation. Nevertheless, such systems have been successfully and effectively maintained for many years in some African countries, especially those that contain large populations exposed to unstable malaria. Every effort should be made to sustain these systems in the future.

However, in most countries of sub-Saharan Africa, the vast majority of the rural population is exposed to stable and intense transmission, and the systems needed for large-scale indoor residual spraying (IRS) do not currently exist. In these countries, the critical question is not whether one intervention is slightly more powerful than the other, but which of the two offers better prospects of achieving high nationwide coverage and long-term sustainability.

In these circumstances, we believe insecticide treated mosquito nets have important advantages. They are less demanding than spraying in terms of infrastructure and organisation. They also allow vector control resources to be targeted toward the pregnant women and young children who are most at risk in stable endemic settings. Nets protect people who use them, but also have community-level benefits, by reducing the number of infected mosquitoes in the area, which in turn reduces the transmission of malaria to people without nets in nearby houses. These benefits are thought to increase incrementally with coverage, across all coverage levels, and will contribute to early gains in equity as programmes scale up.

Moreover, nets can give protection of longer duration than IRS, since a net in good condition gives reduced but still significant protection to the user even after the insecticide has worn off. This means that one risk associated with IRS in intense transmission conditions – that malaria will come flooding back when the insecticide wears off – is less of a danger. This advantage will be further strengthened by the emerging development of long lasting insecticidal net (LLIN) technology, which greatly extends the effective life of the insecticide.

Thus, although IRS does have key advantages in some parts of Africa, most of the region must make a strategic choice between spraying and nets, according to which is more likely to produce widespread and sustained coverage for the 400 million people who currently have neither. For the moment, the evidence suggests that nets are probably the best bet for most people.

Recently, controversy seems to be giving way to consensus, and success stories are emerging using a variety of models. Among these are Eritrea which distributes free mosquito nets directly, and Tanzania, which promotes independent commercial brands by social marketing.

Where nets are being distributed by the public sector, there are often opportunities to integrate this with other delivery systems. These include child-immunisation and antenatal services, which in many countries achieve remarkably high coverage rates. For example, nets are provided to pregnant women in antenatal centres, free of charge in Kenya and at a highly subsidised (very low) price in Malawi. In some parts of Zambia, they have been given to infants along with measles jabs. This concept of integration extends to vaccination cam-

paigns. These are countrywide mopping-up operations, designed to reach and deliver vaccines to those areas and subgroups of the population that are missed by, or do not attend, routine immunisation services. And best of all, the people served by these systems – very young children and pregnant mothers – are the two groups that suffer most from malaria.

Technical advances will also help this process of exploiting and integrating multiple delivery systems. For example, in recent years, a few manufacturers have launched nets with “long lasting” insecticide treatments, which do not need regular re-treatment. There are now good prospects for long lasting insecticide treatments that will be effective on any net, so that nets that are woven in local factories and those that are stitched by local tailors can all become “long lasting insecticidal nets” (LLIN). Recently, a campaign for mass retreatment of nets in Uganda highlighted that more people than expected own untreated nets, and would like to treat them. Conversion of all these nets would double their effectiveness at a very reasonable cost.

Experience shows that a clear plan, adapted to local conditions and involving a coordinated mix of strategies, can result in a rapid expansion in coverage and the creation of a sustainable and robust system that can maintain coverage over the long term. The policy question for a country is not “which strategy”, but “which mix of strategies”. For these reasons, national ITN strategies must be determined by ministries of health and national malaria programme managers, not by external agencies and NGOs.

### 2.3.2 House spraying with insecticides

No mosquitoes – no malaria. The discovery by Ronald Ross in 1897 that mosquitoes were responsible for transmitting the *Plasmodium* parasite opened a new era in mosquito control at the beginning of the twentieth century, allowing the draining of swamps in malaria-infested areas. The United States spectacularly used this insight to build the Panama canal in 1914, whereas malaria had halted an earlier French effort just a few decades before.

Controlling breeding sites, either through draining or insecticides, however, is of limited use against the broader malaria problem, because the sites are often scattered, shifting and numerous, and is only cost effective in places with high densities of human population or economic activity.

**“ As a means of producing a massive and immediate reduction in transmission intensity at the village scale, spraying of the indoor walls of houses with insecticides remains the most powerful anti-malaria weapon ever developed. ”**

The invention of spraying the inside walls of houses with a long-acting insecticide as a means of malaria control just after the Second World War transformed malaria control, as it made mosquito control feasible in places where breeding sites are ubiquitous and houses few and easy to find. For the first time, effective malaria prevention using standardised methods was possible in the vast rural areas, containing many thousands of villages, where previously no form of large-scale control had been possible.

As a means of producing a massive and immediate reduction in transmission intensity at the village scale, indoor residual spraying (IRS) probably remains the most powerful anti-malaria weapon ever developed. It has particular advantages in places where malaria has a patchy

distribution, and where the communities with high incidence of malaria tend to change from year to year, since the places targeted for spraying can be adapted in response to these changing epidemiological patterns.

For this reason – and because the systems needed for house spraying are in many cases already in place – many countries of the Horn of Africa, southern Africa, Latin America, and Asia still rely on house spraying. They consider insecticide treated mosquito nets as generally desirable for reducing individual risk and background levels of transmission, but regard spraying as the weapon of choice for decisive interruption of outbreaks, epidemics and intense transmission peaks in defined locations.

## Recommendation

**New effective drugs and vector control measures have the potential to make a substantial impact. However, they cost considerably more than those used in the past, and will require increased funding.**

The most effective drugs for malaria cost over ten times more than the older treatments that have become obsolete because of drug resistance. They are cheap compared with many other drugs, but are far from affordable to those who need them. Available estimates suggest that subsidies of the order of £ 450 million per year would be sufficient to provide these effective treatments to those who need them.

The mechanism of subsidy should be chosen carefully so that it both delivers subsidised drugs through the same combination of public and private channels that already serve poor communities and remote areas, and provides the funding stability necessary for long-term policy change at the national level. This could be achieved by a range of possible mechanisms, including a central procurement agency as proposed by the US Institute of Medicine of the National Academies.<sup>21</sup> Similar considerations will apply to insecticides and other control methods.

## 2.4 Improving access: creating awareness, improving delivery

Effective methods exist to prevent and treat malaria. The front line of control is easy access to effective drugs to avoid preventable deaths. Unfortunately, this goal is far from being achieved in many malaria-endemic countries in Africa and elsewhere. Health services are often woefully equipped, and lack sufficient trained staff. They constantly run out of vital supplies because of cash shortages and poor distribution systems. Too few people, in particular in remote areas, have access to a clinic at all; and all this against a background where growing drug resistance is undermining whatever systems are in place.

The artemisinin-based combination therapies (ACTs) can cure malaria (see page 11), and solve the immediate crisis of resistance to older drugs. However, health infrastructures and delivery systems must be reinforced if new drugs are to be introduced efficiently. Thus, the strengthening of the health infrastructure together with a coordinated and adequately funded international effort, creates a situation where existing control and therapeutic tools could make an impact.

<sup>21</sup> Saving Lives, Buying Time. Economics of malaria drugs in an age of resistance. Institute of Medicine of the National Academies, 2004.

To achieve this, it is vital to step up engagement and communication with governments, the private sector, and the community. This requires a long-term vision and the understanding that without it few of the available interventions are likely to succeed. There should be no delusion that there exists any quick fix to the malaria problem: what is needed is a sustained effort, over decades, by all parties involved.

Controlling malaria requires much more than simply deciding which intervention measures are best. To make good use of the tools available, these must be adapted to the local situation and environment, and this demands a wide range of support interventions. Functioning information systems are needed to ensure a supply of high quality information on factors such as local drug resistance patterns or epidemics. This often needs to take the form of operational research, which can be conducted locally and forewarns of trouble. Interventions must be able to be applied in a decentralised fashion.

**“ There should be no delusion that there exists any quick fix to the malaria problem; what is needed is a sustained effort, over decades, by all parties involved. ”**

Effective communication strategies must be in place, so that people have access to information on how to protect themselves from malaria. Practical working systems need to be developed to make malaria prevention and treatment available and usable to everybody at risk. The management capacity in public, private and community-based systems to make this work is crucial and often lacking.

One key to success in expanding access is to procure and manage supplies of drugs and insecticides on a much larger scale than in the past. Already supply often fails to meet demand, and this is an appalling lost opportunity. To address this, the Roll Back Malaria Partnership has recently established the Malaria Medicines and Supplies Service (MMSS) to work on global forecasting, procurement and supply. It is also essential to build the capacity of the pre-qualification system which ensures that suppliers of new drugs and insecticides meet set criteria; and national regulatory agencies and procurement systems are strengthened and supported to have greater self-reliance.

Action at the community level must be a priority. If communities were better informed about what malaria is, how it is transmitted and how to recognise its symptoms, they would be more empowered to adopt measures to prevent malaria and to seek appropriate treatment. Current efforts to provide better access to therapies include training community volunteers, mothers, and the local shopkeepers who, for much of Africa are the local pharmacy from where antimalarial drugs can be obtained. Such efforts must be amplified. Malaria is a disease largely of the poorest in societies, and these are the people with least access to accurate information.

## 2.5 Widening the support base for the fight against malaria

Too often it is assumed that helping countries to tackle malaria is the job of a few specialised technical groups and funding agencies. These play an important role, but they need support from a much broader coalition if a long-term strategy is to be created and sustained.

Overall funding and resources available for malaria have in the past been too dependent on a handful of major donors, with their particular priorities. Many of the problems in tackling malaria today are the legacy of this system. In particular, swings in priorities have created a “boom-and-bust” approach to malaria control, with massive investment from the 1950s to 1970s, for example, being followed by a dearth of funding in the following two decades.

**“ One disastrous result is that there are fewer people competent in large-scale mosquito control now working in Africa than there were 50 years ago as a result of the phasing out of national control programmes from the 1970s onwards. ”**

Rational forward planning is impossible in this kind of funding environment, and is a major barrier to the development of solid malaria control programmes. Broadening the base of those with an informed commitment to tackling malaria is among one of the biggest changes needed to achieve progress.

## Recommendation

**Improved and new international financing mechanisms, capable of providing sustained and steady investment over many years, are critical to the success of a scaled-up effort to control malaria in Africa and elsewhere. The international community needs to assemble donors, governments, non-governmental organisations, malaria-endemic countries and the private sector to secure long-term adequate funding for malaria control.**

The Global Fund to Fight AIDS, Tuberculosis and Malaria, founded in 2001, has made remarkable achievements in raising and delivering funds for malaria on a far larger and faster scale than before. Future financial commitments by donor countries to the Fund remain uncertain, however. The Global Fund deserves strong support and will require substantial increase in funding.

Improved coordination between the Global Fund and other international bodies, such as the Roll Back Malaria Partnership, is also needed, for example to better exploit implementation research within grants. If good interventions are to reach those who need them, it is crucial that funding should not focus only on commodities but support stronger systems to deliver interventions.

Novel financing systems are also needed to address key bottlenecks such as much higher costs of new drugs. Funding mechanisms for the provision of a malaria vaccine in the future also need to be vigorously explored. The UK has been at the forefront of recent innovations to bring additional incentives and financing to bear on health problems faced by developing countries. The UK’s commendable leadership on innovative solutions such as the International Finance Facility and Advanced Purchase Contracts should be explored and expanded during its presidencies this year of the G8 nations and the European Union.

## 2.6 Engaging the private sector

In many countries, the private sector, including shopkeepers, is the major outlet for malaria treatments. Local shops often double up as pharmacies in many developing countries, with drugs being sold over the counter. The shopkeepers, however, usually have no training in pharmacy. Private companies also play a major role in the distribution of mosquito nets.

The private sector, in the form of large companies, also plays a substantial role in malaria control in many countries. For example, The Konkola Copper Mine in the Konkola highland copper belt in northern Zambia, has over the past five years financed and run an effective campaign to protect its workers and the community against infection. The programme has halved the number of malaria cases among some 350,000 people living in a 2,700 km<sup>2</sup> zone.

Similarly, commercial companies, including BHP Billiton, a company that operates an aluminium smelter in Maputo, Mozambique, are involved in the Lubombo Spatial Development Initiative Malaria Control Programme, cross-border collaboration between the governments of Mozambique, South Africa and Swaziland to control malaria in the Lubombo region stretching across eastern Swaziland, southern Mozambique and north-eastern KwaZulu Natal.

It is therefore impossible to conceive anti-malaria strategies without taking into account the private sector. There are also relatively untapped opportunities here for greater training of those working in these sectors, and to exploit these existing networks, for example, to educate consumers about proper use of antimalarial drugs.

Failing to take the private sector properly into account can also cause problems on the ground. Providing heavily subsidised antimalarial drugs through government health centres, without considering the high street price of the same drugs is simply “inviting” poor people not to complete the course, and to sell the remainder of drugs in the market, or to keep them until the next malaria infection. There have been also cases of existing sustainable markets for mosquito nets being damaged by the delivery of free nets.

Investments to make better use of the private sector range from strengthening government roles in regulation and stewardship, sharing information effectively, engaging it in developing policies, and creating an enabling environment for a thriving and productive private sector.

## 3. Using evidence to move forward

### 3.1 Research to develop new and better tools

#### 3.1.1 Drug development

The frontline in the war against malaria remains the use of effective and inexpensive antimalarial drugs. The explosion of parasite resistance to drugs makes it more pressing than ever to find new drugs. However, until recently the pipeline of new antimalarials was almost dry, as the pharmaceutical industry and government sponsored research programmes had all but abandoned malaria research. The travellers' market for malaria prophylaxis is too small to attract investments necessary to develop new drugs for people living in disease-endemic regions. Tropical disease research has been a major casualty of the consolidation of the pharmaceutical industry over the past decades, with companies tending to concentrate their resources on fewer, more profitable areas. Thus, drugs whose market is largely in developing countries have been squeezed out. Of the 1,223 new drugs registered between 1975 and 1996, only three were antimalarial drugs. Moreover, the handful of new antimalarial drugs currently being developed come from just three families of compounds: quinolines, antifolates and artemisinins.

**“ Given the time needed to take leads for new drugs through clinical trials to market, we urgently need to prime the drug pipeline now with new classes of molecules to stay one step ahead of drug resistance. ”**

Artemisinin-based combination therapies (ACTs) have revolutionised treatment in south-east Asia, and Africa is now also switching to this class of drugs, despite their higher costs. However, resistance will inevitably catch up with artemisinins at some point in the future. Given that it could take many years to develop drugs, we urgently need to prime the drug pipeline now with new classes of molecules to stay one step ahead of drug resistance.

The prospects for discovering new drugs are better now than they have ever been. This turnaround can mainly be attributed to the establishment of Medicines for Malaria Venture (MMV) which is managing a portfolio of around 20 drug discovery and development projects, the largest in history. By subsidising discovery, development and registration of antimalarial drugs it has persuaded the pharmaceutical industry to re-engage in the development of new antimalarials and fostered numerous collaborations with researchers around the world. MMV hopes to register at least one new, affordable antimalarial drug by 2010 and maintain a sustainable pipeline of antimalarials to stay a step ahead of drug resistance. It also aims to develop drugs for specific patient groups such as children. MMV's optimism needs to be cautioned, however. MMV's budget is small, at around US\$ 25 million per year, most of which comes from the Bill and Melinda Gates Foundation and other foundations. As more of the drug candidates are moving into the expensive stages of clinical trials, the budget is likely to double or even triple. Its success will largely be dependent on substantial increase in funding.

Indeed, the emerging predominant model for research and development (R&D) on tropical diseases is one where large public-private partnerships bring together companies, donors,

universities and academic research centres, and governments. Companies supply the partnerships either with direct support or 'in kind' contributions through pharmaceutical and project-management expertise and access to technologies and resources such as combinatorial chemistry and high-throughput screening.

This public-private partnership (PPP) model is proving to be a highly efficient and effective model for developing new tools for diseases of poverty. In fact, many compounds in the current PPP pipelines originated in government and academic research institutes with public funding. This new mechanism of conducting research is translating basic scientific research into life-saving solutions. It would only be natural that rich governments commit much more to R&D of new tools so that their past investments are not wasted.

**“ The explosion of parasite resistance to drugs makes it more pressing than ever to find new drugs, but until recently the pipeline of new antimalarial drugs was almost dry as government sponsored research programmes and the pharmaceutical industry had all but abandoned malaria research. ”**

Having a new drug is one thing, but research is also needed to know how best to use it. Drugs have to be extensively tested for factors such as stability, toxicity or cost, and research is needed to monitor the emergence of resistance in the field.

It is not just new drugs which are needed. A good drug used badly seldom achieves an impact. Operational research on how best to use antimalarial drugs has historically been an area of research where the UK and Europe have excelled in collaboration with partners in Africa and Asia. It is through this kind of field research that the new drugs in the lab can become life-saving treatments used in clinics. At present, most such research is funded, however, by private foundations such as the Bill & Melinda Gates Foundation, and to a lesser extent the UK Wellcome Trust. Government funding for such research, which is both essential and cost effective, has been surprisingly sparse. The Special Programme for Research and Training in Tropical Diseases (TDR) – a Geneva-based initiative sponsored by the United Nations, the World Bank, UNICEF and the World Health Organization – is one of the few institutions which manages the large number of relatively small grants needed for such operational research. It is essential that this level of research is properly supported: it is as important as the basic research. Sustained government investment in this area should be considered a priority.

#### 3.1.2 The hunt for a vaccine

Political leadership may turn out to be as important as science in the search for a malaria vaccine. This research may receive a welcome shot in the arm, through an initiative<sup>22</sup> proposed by Gordon Brown in November 2004. The plan calls on the international community to embrace an advance purchase commitment, agreeing to purchase billions of dollars worth of a malaria vaccine that meets specific characteristics of performance.

If this materialises it would spark much-needed industrial interest in vaccine development. This is critical, as basic science has generated an impressive array of candidate malaria vaccines over the past decade. However, a major bottleneck is the costly industrial development needed to take these candidates out of the laboratory and into clinical and safety trials, and

<sup>22</sup> [http://www.hm-treasury.gov.uk/newsroom\\_and\\_speeches/press/2004/press\\_94\\_04.cfm](http://www.hm-treasury.gov.uk/newsroom_and_speeches/press/2004/press_94_04.cfm)



ultimately into the field. The huge cost that this entails is unattractive to industry, particularly as the market for any malaria vaccine will mainly be in poor developing countries. Incentive schemes are therefore key to attracting industry back into the field.

The UK is very strong in basic research on malaria and also supports leading research sites in Africa suitable for malaria vaccine efficacy trials, yet it invests very little in the translational research required to link the two. Focused support targeting this gap could have a major effect.

This is all the more important now because malaria vaccine research and development is at an exciting and challenging stage. Powerful biotechnologies are revolutionising opportunities for production of much needed new and improved vaccines for all diseases, including malaria. The result is a long list of candidate malaria vaccines in preclinical or early clinical stage development.

**“ Basic science has generated an impressive array of candidate malaria vaccines over the past decade. ”**

Improved international coordination of vaccine efforts is now necessary, for example to focus greater support on the most promising candidates, by weeding out less successful projects.

This is all the more important, because the recent scientific landmark represented by the sequencing of the entire genome of the malaria parasite is likely to spur the discovery of many new vaccine candidates. Greater coordination of global malaria vaccine development should be facilitated by the current Malaria Vaccine Technology Roadmap project, coordinated by PATH's Malaria Vaccine Initiative (MVI), a US-based non-profit organisation supporting vaccine development.

Lack of funds, however, remains the major obstacle to malaria vaccine development. Total annual funding for malaria vaccine development increased from US\$ 42 million in 1999 to US\$ 85 million in 2004.<sup>23</sup> This has accelerated progress, but is insufficient, and is for example only around one-tenth of that invested in HIV vaccine development.

The US National Institutes of Health is the largest funder of malaria vaccine research followed the Bill & Melinda Gates Foundation. Government support, including that from Britain, has been minimal.

After many false starts, some malaria vaccines are showing promise in clinical trials. Major scientific challenges are being overcome. It is likely that some current partially effective vaccines will need to be used together, as a combination vaccine targeting several stages of the parasite's life cycle, to generate a highly effective product. The time required to develop and deploy these new vaccines will be determined in large part by the investment the international community decides to make over the next few years in their development, manufacture and use.

<sup>23</sup> [http://www.path.org/files/MVI\\_vaccine\\_funding.pdf](http://www.path.org/files/MVI_vaccine_funding.pdf)

### **3.2 Monitoring, evaluation and implementation research: putting malaria control on a more solid scientific footing**

International donors, and the Global Fund in particular, are creating new funding mechanisms, and with more money flowing into the purchase of drugs, mosquito nets, and insecticides, there is an enormous opportunity to expand malaria control efforts in Africa. However, simply supplying commodities such as drugs, mosquito nets, and insecticides is not enough.

Ensuring that these tools are applied effectively and delivered to those who need them in reliable, sustainable and cost-effective ways requires a web of accompanying measures, including rigorous field research, and policy development. Quite simply, if investments are to be used well, much more must be devoted to monitoring and measuring the performance and impact of the activities. In particular, we have much to learn about how to scale up our delivery systems in order to achieve the greatly expanded coverage defined by international development targets. There is then the need to identify, and find ways to solve, the key obstacles to scaling up – the social barriers, operational failures, or technical glitches that stop drugs and mosquito nets from getting to the people who need them. All this comes under the heading of intervention research.

Malaria control strategies should be based on science-based decision-making, allowing tools to be better implemented, their impact properly assessed, and most importantly their efficacy improved upon.

**“ Much fanfare has been given to the international community's pledge to meet “targets” to halve the number of malaria deaths within the next decade or so. But the truth is that programmes and scientists have little idea of how many people become ill or die from malaria, or where... More attention to monitoring and evaluation is essential to assess what impact the introduction of mosquito nets or new drugs is having on reducing the disease and death caused by the malaria pandemic. ”**

For a start, we need better ways to map malaria and to monitor the disease and death it causes. This is required partly in order to identify the places most at risk and to quantify the burden due to malaria. Above all, it is needed in order to know whether and how our interventions are working: are we achieving and sustaining the coverage, and is this resulting in effective reductions in the disease?

Measuring impact on disease is of course the bottom line of the whole process, but it is only a part of intervention research, which is mainly concerned with the operational, social and technical details of the process by which this impact is achieved. For example, who goes to the hospital to get drugs, and who goes to the shop? Which drugs do they obtain, and are these drugs fake? Who has nets and who has not, and are the nets treated? Who in the family uses the net if not all the beds have one? For example, we now know that in families that own nets, the youngest children are much more likely than their fathers to be sleeping under a net. Similarly, in much of East Africa, net-ownership tends to be more common in urban areas and in rich households; but that is not the case everywhere, and in parts of West

Africa and Madagascar the reverse is true. These questions are simple but they are critical, and tend to be neglected when compared with more basic research, since acquiring such large-scale data can be a relatively cumbersome exercise.

At the policy and strategy level, a variety of public and private channels are available to distribute drugs and mosquito nets, and all have a role to play. However, ensuring that they operate in a complementary and synergistic way is a challenge, as is deciding which combination is best in a given area. For example, giving away large numbers of mosquito nets through the public sector is probably the most effective means to distribute large amounts quickly, but encouraging a sustainable market in mosquito nets, although slower to get up to speed, might be a more sustainable long-term solution.

To manage the balance between such different approaches, public health planners at the national level will need better information than is currently available about the relative performances, and advantages and disadvantages of alternative distribution systems. Individual mosquito net projects and case studies can provide such data, so it is important to standardise assessment methods (taking into account local needs), so that data from different programmes can be compared, and provide national health authorities with the information they need to plan and manage national strategies, and to monitor progress towards global coverage targets.

These needs have to be dealt with internationally, as does the task of developing methods and strengthening local research institutes. The key issue here is the scarcity of research funding sources. The Department for International Development (DFID) research budget is small, but it remains one of the few agencies willing to fund research of this kind and at this level.

Finally, some of the implementation research needed to support scaling up is technical. For example, mapping of drug resistance is a priority for national planning, and mapping of insecticide resistance is also essential. This requires trained African researchers at every level, from the ministry of health down to the district staff and field workers.

### Recommendation

Research and development (R&D) of new drugs, vaccines, and insecticides needs to be funded at much higher levels than it is today. Investment in infrastructure and new tools needs to be complemented by well-targeted research.

Public-private partnerships are emerging as a major force in research and development for tropical diseases, and are easing the major bottleneck between basic science and its industrial development. However, most of these partnerships are currently underfunded, and much greater support will be needed as promising leads for new drugs, vaccines, and insecticides move through the expensive phases of trials to bring them to market. Their success will be highly dependent on adequate and sustained funding.

Developing cost-effective control strategies, and then defining how best to apply them requires research. Science-based strategies are needed for both existing tools and delivery systems, and to prepare the introduction of new tools. This type of research is currently neglected, and needs to be more strongly supported.

## 4. Defeating malaria for good: sustaining commitment

### 4.1 Mainstreaming malaria in development

Malaria control efforts must be made an integral part of broader health and development policies and programmes in malaria-endemic countries if they are to become sustainable. The case for malaria control is itself compelling in terms of its extraordinary health and economic returns; but it must compete with other worthy causes for attention and funding. On the other hand, malaria is intricately linked to poverty and should be considered as an essential component of broader health and development policies.

By distributing malaria-prevention measures with the delivery of drugs, vaccines and clean water, more cost-effective use of scarce financial and staff resources is possible, with concomitant advantages for increasing the reach of malaria control efforts. Examples of opportunities for this kind of integration – in this case integration with vaccination and antenatal services – have been discussed above. To achieve this, both malaria and other African disease control initiatives need to reach out beyond their traditional interest groups.

**“ Malaria is intricately linked to poverty and should be considered as an essential component of broader health and development policies. ”**

The World Health Organization's and UNICEF's Expanded Programme on Immunisation (EPI) is one of the best-functioning systems providing regular health contact with young children in Africa – worldwide average vaccination coverage of children under five has grown from around 5% at EPI's launch in 1974, to around 80% today. Antenatal care is often well-attended, and is a perfect opportunity not only to provide pregnant women with malaria prevention, but to communicate educational information on malaria. And best of all, the people served by these systems – the youngest children and pregnant mothers – are the two groups who suffer most from malaria.

Looking further afield, existing networks such as school education and agriculture provide untapped opportunities to expand access to malaria control measures and information.

### 4.2 Building capacity

Speak to any scientist in Africa and you will hear the same message: to turn the tide of malaria, African leaders, doctors and researchers must take matters more into their own hands, translating research and control measures into sustainable local campaigns.<sup>24</sup> More needs to be done on the ground, they say. And for this to happen, they need more political will and money, and more local talent.

<sup>24</sup> Butler D. Power to the People. *Nature*, 2004, 430: 928–929.

Indeed, the benefits of increased investment in malaria control will not make a lasting difference unless a major effort is made to build local competences and workforces. Malaria control, and the research, monitoring and evaluation it depends on, require having adequate numbers of well-trained and paid staff. At present the human resources for implementing control in malaria endemic countries are poorly supported.

Qualified African researchers are also needed because drugs and vaccines must also be tested in Africa. Their effectiveness can only be assessed on large trial populations in areas where the disease is endemic, and under realistic conditions of use.

Unfortunately, well trained researchers, public health specialists and operational staff are scarce in most malaria-endemic countries, particularly in Africa where the HIV/AIDS pandemic has placed additional demands on the available human resources.

The increasing funding for malaria offers opportunities to redress the shortage of staff. So far, the main emphasis of budgeting and planning has been on purchasing commodities such as drugs and mosquito nets, and on logistics. Insufficient attention has been given to human resource needs.

**“Control will not make much progress unless the international community is willing to tackle the gross under-funding and major problems of health service infrastructure in Africa” concludes Anne Mills, a health economist at the London School of Hygiene and Tropical Medicine. “Individual disease initiatives can only go so far when basic health infrastructure is weak or non-existent.”<sup>25</sup>**

The World Health Organization, the Gates Malaria Programme and the Multilateral Initiative on Malaria all have initiatives in this area, but they are too small compared with the scale of needs. What is now needed is to include a major capacity building initiative within international malaria efforts. Needs for trained health staff cut across sectors, however, and therefore any malaria initiative should be within a broader long-term programme to reinforce human health resources in Africa.

Controlling malaria requires individuals with skills as diverse as management, monitoring, evaluation, communications, direct marketing, procurement forecasting, finance, water engineering, manufacturing and industrial chemistry. Some of these skills are found within those who specialise in public health and in academics, but the great majority of those with expertise in these areas are well beyond the boundaries of the traditional malaria community. Involving people with these kinds of expertise in initiatives such as marketing of mosquito nets is clearly essential. It is crucial that this key issue be addressed, as otherwise increasing investment in Africa risks being wasted.

<sup>25</sup> Butler D. *Nature*, 2002, 419: 426–428

## Recommendation

**Investing in delivery systems is essential, and will improve not only malaria control but also other health programmes. Comprehensive support for delivery mechanisms, and in particular for badly-needed human resources, should be better balanced with investment in commodities.**

By working through local government and civil society, it will be possible to build the capacity, accountability and ownership needed for sustained progress in malaria control. Public education and awareness are important for impact. The resource in shortest supply to control malaria effectively is trained and well-motivated people at every level from the community to the ministries, through research institutions, to programme managers in the field. Without trained people on the ground to provide care and conduct research, the good tools we have will not be properly or sufficiently deployed to reach those who need them.

## 4.3 Sustaining political commitment

Africa, the world's poorest continent, is currently at the top of the global agenda, and a major plank of Britain's year-long presidencies of both the European Union and the Group of Eight rich nations (G8). On the table are proposals to provide debt relief for the poorest countries, ease protectionist trade barriers, and create a fund, the International Finance Facility, which would raise up to US\$ 50 billion annually in aid.

But the enormous benefits promised by these new initiatives risk being compromised by the sheer scale of the human and economic burden of malaria in Africa. The 17-member international Commission for Africa, created to address the challenges facing the continent, acknowledges in its report, published in March 2005, that controlling malaria is critical to social and economic progress.<sup>26</sup>

This report of the All-Party Parliamentary Malaria Group complements the Commission for Africa's work, and expands in greater detail on how to respond to the challenge of malaria. It concludes that to have a chance of success, any new initiative for Africa must be accompanied by a massive and sustained science-based scale up of efforts to stamp out malaria on the continent.

Target 6 of the UN Millennium Development Goals<sup>27</sup> is a commitment to halt and reverse the incidence of malaria by 2015. The goal of the Roll Back Malaria Partnership – which today brings together bilateral and multilateral agencies, the private sector, foundations, academia, non-governmental organisations – is to halve malaria deaths by 2010. However, the burden of malaria still remains a huge weight and many endemic countries are struggling hard to meet these goals. They can only be met if the current political momentum is supported and sustained.

<sup>26</sup> *Our Common Interest*. Report of the Commission for Africa, released on 11 March 2005. (<http://www.commissionforafrica.org/english/report/thereport/cfafullreport.pdf>)

<sup>27</sup> <http://www.developmentgoals.org>

## Potential new financing mechanisms for malaria: two examples

### The International Finance Facility (IFF)

This concept, proposed by the Chancellor of the Exchequer, would raise an estimated US\$ 50 billion per year in additional resources to boost efforts towards realising the Millennium Development Goals by 2015.

The IFF mechanism is based upon developed country governments borrowing monies above current official development assistance (ODA) on the international bond markets, and investing those resources in development approaches likely to provide an appropriate return on the investment. Such an approach would allow front-loading so that larger investments could be made today leading to long-term cost savings and health impact. They would also be cost effective with rapid scale up, such that the public health intervention would be a wise investment with a timeline for delivering impact that justifies the investment of IFF resources.

The IFF approach is under development with a pilot version to support immunisation – one of the most successful and cost-effective disease control interventions available. The pilot should be closely monitored, and successes should be rapidly built upon and expanded for malaria. Success of the IFF pilot can show both what and how such resources can be utilised and targeted, including which aspects of malaria control, and research and development (R&D) could best benefit from such an approach.

### Advance Purchase Contracts

The UK treasury also announced in November 2004 that it will consider making a commitment to purchase of the order of 300 million doses of an effective malaria vaccine if it were to be developed and made available. This unique and innovative approach has the potential effect of stimulating a market for a vaccine that would otherwise be of little interest to the private sector. Coupled with additional investment in research and development through public-private partnerships, it should help to stimulate and speed up industrial investment in vaccine research.

This approach has the potential to change fundamentally how the G8 and other governments invest in new interventions and development activities. It is a mechanism that could also be considered for new antimalarial drug development and the present gaps in confidence in the market for already tested tools, such as artemisinin-based combination therapies (ACTs) and long lasting insecticidal nets.

Why are so many people still sick and dying from malaria when effective tools are available to control it? Malaria is completely treatable using drugs, and mosquito nets and insecticides can protect people from mosquito bites. But these tools are not getting to those who need them.

Sustainability of resources is essential to undertake programmes aiming at long-term reduction in malaria burden. Predictable future resources provide a level of confidence that the health and wider development impact an intervention brings will be maintained into the future. Funding agencies involved in malaria, and the various technical groups, play an important role in supporting malaria control efforts within countries.

The gross national product (GNP) per capita of many countries in Africa is about £ 250 or less. Many of these governments spend about £ 3–5 per capita per year on all health care, so decisions on which interventions to support and how to target them become extremely challenging. Financial and economic themes play central roles, as poor countries attempt to deliver current and plan for future interventions.

The tension between cost-effectiveness and affordability described earlier argues for external support, so that poor countries can afford to choose the most cost-effective interventions. Donors and new financing mechanisms such as the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) can at least temporarily address affordability by providing free or highly subsidised commodities to countries, but the support will be needed until commodity prices come down and health spending goes up.

Subsidised commodities also generate incentives for industry to invest in research to develop new and improved drugs, vaccines, and insecticides. Such commodities have until recently achieved very limited market demands, but the funding of purchases, through the Global Fund, for example, represents a major increase in demand. Securing such a demand at high volumes will surely fuel research and development. As shown by Advance Purchase Contracts (see box above), industry is beginning to realise that there are now buyers for medicines and tools for diseases of poverty.

Determined action by the international community, sustained over decades, is therefore now needed to control malaria. This would involve scaling up integrated control programmes over entire regions, combining the best weapons we have – drugs, insecticide treated mosquito nets, and house spraying – in a science-based strike to both prevent and control malaria. In parallel, a major hike in investment in research to develop new and better drugs and other tools is essential.

The biggest obstacle to progress at present is not a shortage of science, but a paucity of political will to deal with malaria. Compared with AIDS, for example, malaria is neglected by politicians, researchers, drug companies, activists and the media.

The Commission for Africa notes that: “malaria is the biggest single killer of African children, and half those deaths could be avoided if their parents had access to diagnosis and drugs that cost not much more than US\$ 1 a dose.” The World Bank estimates that malaria alone slows African economies by 1.3% per year – a 32% reduction in African GDP over 35 years. Malaria, concludes the Bank, costs African economies US\$ 12 billion annually.<sup>28</sup>

Yet despite malaria's devastating toll, funding for malaria control by international donors has typically amounted to just US\$ 100–200 million annually.

**“ With the resources currently available, say health economists, talking about defeating malaria is like promising to build a US\$ 100 million skyscraper with just US\$ 1 million in the bank. The stark truth is: if we don't bankroll the effort, we won't roll back malaria. ”**

At least US\$ 2–3 billion each year is what is needed to make any serious impact on malaria in Africa; however, according to the UN Millennium Project's Task Force on Malaria – the equivalent of just 2–3 days' worth of US and European Union farm subsidies. At the same

<sup>28</sup> <http://tinyurl.com/5mx5n>

time, it identified malaria as a “quick-win” opportunity where “very modest investments could lead to enormous breakthroughs in human well-being and economic development.” Malaria control is an excellent investment in development, giving exceptional economic and health returns.

The world has repeatedly, and with much fanfare, pledged to spectacular targets for reducing the malaria burden - these will never be met if we don’t provide the necessary resources. The international community now has an opportunity and a duty to reduce the malaria burden, boost the economies of African countries, and improve global health.

The All-Party Parliamentary Malaria Group has provided a forum where parliamentarians and the many organisations working in malaria have come together and found a new and united voice to deal with this complex disease. There is growing support to tackle the problem, however, it now must be matched with increased and sustainable funding.

Tony Blair once described the neglect of Africa as a “scar on the conscience of the world.” Britain's presidency this year of the G8 nations and the European Union provides a window of opportunity for it to lead the international community in establishing a global coalition to define and implement a massively scaled-up long-term international programme to heal the sore of malaria in Africa.

## Recommendation

**2005 is a unique year in British leadership. The government must use this opportunity to take the lead in tackling one of the most important yet tractable health problems that is keeping much of the world in poverty.**

The UK has an excellent record of recognising and supporting malaria control, both directly and through strengthening the systems to deliver interventions. It has recognised the benefits of multiple approaches from its upstream policy work on access to medicines to its country level support for national programmes to its investment in research and development. It is now in a position to fulfil the responsibility of its leadership role by taking a stand to work with the international community to free millions from the threat of malaria.

Africa, the world's poorest continent, is currently at the top of the global agenda, and a major plank of Britain's year-long presidencies of both the European Union and the Group of Eight rich nations. On the table are proposals to provide debt relief for the poorest countries, ease protectionist trade barriers, and create a fund, the International Finance Facility, which would raise up to US\$ 50 billion annually in aid. Britain has a window of opportunity to lead the international community in establishing a global coalition to define and implement a massively scaled up long-term international programme to control and roll back malaria.

## 5. Recommendations

### Recommendation 1

**This report's principal finding is that the huge burden of malaria worldwide can be reduced.** Malaria is a killer disease, whose importance, until recently, was neglected. It is a major cause of poverty and a heavy burden on already vulnerable national economies.

Malaria can be cured and prevented. **We have the tools, but creating efficient and sustainable systems to deliver these tools to where they are needed requires substantially increased investment by the international community.**

The case for a massive and sustained increase in investment in malaria control is reiterated and argued throughout this report.

The biggest obstacle to progress at present is not a shortage of knowledge, but a paucity of political determination to deal with malaria. **Above all, funding must be maintained over decades, if progress is to be sustained. History teaches us that temporary enthusiasm for malaria control, without long-term commitment, is a recipe for failure and disillusionment. The “boom-and-bust” approach to malaria funding is perhaps the biggest obstacle to progress.** Determined action by the international community, sustained over decades, is now needed. This must involve scaling up integrated control programmes over entire regions, combining the best weapons we have – drugs, insecticide treated mosquito nets, and house spraying. In parallel, a major hike in investment in R&D is essential in order to improve the effectiveness of our delivery systems and to develop new and better drugs and other tools for the future.

### Recommendation 2

**New effective drugs and vector control measures have the potential to make a substantial impact. However, they cost considerably more than those used in the past, and will require increased funding.**

The most effective drugs for malaria cost over ten times more than the older treatments that have become obsolete because of drug resistance. They are cheap compared with many other drugs, but are far from affordable to those who need them. Available estimates suggest that subsidies of the order of £ 450 million per year would be sufficient to provide these effective treatments to those who need them.

The mechanism of subsidy should be chosen carefully so that it both delivers subsidised drugs through the same combination of public and private channels that already serve poor communities and remote areas, and provides the funding stability necessary for long-term policy change at the national level. This could be achieved by a range of possible mechanisms, including a central procurement agency as proposed by the US Institute of Medicine of the National Academies.<sup>29</sup> Similar considerations will apply to insecticides and other control methods.

<sup>29</sup>Saving Lives, Buying Time. Economics of malaria drugs in an age of resistance. Institute of Medicine of the National Academies, 2004.

### Recommendation 3

**Improved and new international financing mechanisms, capable of providing sustained and steady investment over many years, are critical to the success of a scaled-up effort to control malaria in Africa and elsewhere. The international community needs to assemble donors, governments, non-governmental organisations, malaria-endemic countries and the private sector to secure long-term adequate funding for malaria control.**

The Global Fund to Fight AIDS, Tuberculosis and Malaria, founded in 2001, has made remarkable achievements in raising and delivering funds for malaria on a far larger and faster scale than before. Future financial commitments by donor countries to the Fund remain uncertain, however. The Global Fund deserves strong support and will require substantial increase in funding.

Improved coordination between the Global Fund and other international bodies, such as the Roll Back Malaria Partnership, is also needed, for example to better exploit implementation research within grants. If good interventions are to reach those who need them, it is crucial that funding should not focus only on commodities but support stronger systems to deliver interventions.

Novel financing systems are also needed to address key bottlenecks such as much higher costs of new drugs. Funding mechanisms for the provision of a malaria vaccine in the future also need to be vigorously explored. The UK has been at the forefront of recent innovations to bring additional incentives and financing to bear on health problems faced by developing countries. The UK's commendable leadership on innovative solutions such as the International Finance Facility and Advanced Purchase Contracts should be explored and expanded during its presidencies this year of the G8 nations and the European Union.

### Recommendation 4

**Research and development (R&D) of new drugs, vaccines, and insecticides needs to be funded at much higher levels than it is today. Investment in infrastructure and new tools needs to be complemented by well-targeted research.**

Public-private partnerships are emerging as a major force in research and development for tropical diseases, and are easing the major bottleneck between basic science and its industrial development. However, most of these partnerships are currently under-funded, and much greater support will be needed as promising leads for new drugs, vaccines, and insecticides move through the expensive phases of trials to bring them to market. Their success will be highly dependent on adequate and sustained funding.

Developing cost-effective control strategies, and then defining how best to apply them requires research. Science-based strategies are needed for both existing tools and delivery systems, and to prepare the introduction of new tools. This type of research is currently neglected, and needs to be more strongly supported.

### Recommendation 5

**Investing in delivery systems is essential, and will improve not only malaria control but also other health programmes. Comprehensive support for delivery mechanisms, and in particular for badly-needed human resources, should be better balanced with investment in commodities.**

By working through local government and civil society, it will be possible to build the capacity, accountability and ownership needed for sustained progress in malaria control. Public education and awareness are important for impact. The resource in shortest supply to control malaria effectively is trained and well-motivated people at every level from the community to the ministries, through research institutions, to programme managers in the field. Without trained people on the ground to provide care and conduct research, the good tools we have will not be properly or sufficiently deployed to reach those who need them.

### Recommendation 6

**2005 is a unique year in British leadership. The government must use this opportunity to take the lead in tackling one of the most important yet tractable health problems that is keeping much of the world in poverty.**

The UK has an excellent record of recognising and supporting malaria control, both directly and through strengthening the systems to deliver interventions. It has recognised the benefits of multiple approaches from its upstream policy work on access to medicines to its country level support for national programmes to its investment in research and development. It is now in a position to fulfil the responsibility of its leadership role by taking a stand to work with the international community to free millions from the threat of malaria.

Africa, the world's poorest continent, is currently at the top of the global agenda, and a major plank of Britain's year-long presidencies of both the European Union and the Group of Eight rich nations. On the table are proposals to provide debt relief for the poorest countries, ease protectionist trade barriers, and create a fund, the International Finance Facility, which would raise up to US\$ 50 billion annually in aid. Britain has a window of opportunity to lead the international community in establishing a global coalition to define and implement a massively scaled up long-term international programme to control and roll back malaria.

## 6. Lessons from the 1950s global campaign to eradicate malaria

The present global determination to control malaria more effectively can draw some lessons from the Global Eradication Campaign of 1955–1969. At the time malaria was much more widespread geographically than it is today, killed more people than any other disease, and was slowing the economic development of many countries. The optimism that malaria could be eradicated can be summed up in three letters: DDT.

The powerful insecticide DDT, discovered in 1939 by the Swiss chemist Paul Müller who was awarded the 1948 Nobel Prize in Physiology or Medicine, earned accolades during the Second World War for killing the head lice that spread typhus and the mosquitoes that transmit malaria. The heady hopes for DDT inspired the international community to embark on a Global Eradication Campaign aimed at eliminating the mosquito vector from large parts of the planet.

This massive effort, undertaken between 1955 and 1969, succeeded in eradicating the disease from large swathes of North America, southern Europe, the Middle East, the former Soviet Union, and parts of South America and Asia. By 1970, some 727 million people, over half of those previously exposed, were freed from the risk of malaria. Apart from saving millions of lives, the campaign spurred economic development in the Americas, Asia, south and south-east Europe and in India. It also stimulated the training of thousands of health workers, which led to a resurgence in public health services in many countries.

### 1. Organisation and funding

The campaign represented an all-out attack on malaria. This level of global commitment has not been seen since. The World Health Organization coordinated the campaign and provided expertise, with multilateral and bilateral agencies funding many national campaigns – the main donors were WHO, the UN Expanded Programme of Technical Assistance (EPTA), UNICEF, the Pan American Health Organization (PAHO) and the US Agency for International Development (USAID). “Countries were encouraged to look on eradication as an ‘urgent measure, outside the regular routine of health departments’, as integration with other programmes might interfere with both the achievement of standards as well as objectives within the limited time foreseen.”<sup>30</sup>

Financial assistance from WHO/PAHO and UNICEF amounted to US\$ 159 million from 1957 to 1967 (= nearly US\$ 994 million today with inflation adjusted), while US bilateral assistance from 1958 to 1965 is estimated at approximately US\$ 190 million (=US\$ 1.2 billion today). There was further support from other bilateral and international funds, and the malaria-endemic countries themselves were estimated to pay for at least 75% of the total cost of the programme. In 1959 WHO estimated the total cost of malaria eradication would be US\$ 1,691 million globally (nearly US\$ 11 billion today). In the late sixties estimates of the cost of eradication per capita per year were US\$ 0.07 to 0.6 (US\$ 0.4 to 3.4 today).<sup>31</sup> This is a substantial commitment, particularly considering that the campaign was mostly focused on deploying DDT to do the job.

Despite recent international initiatives, we are still far from having this level of commitment, and a single sense of purpose by international agencies and donors.

### 2. Efforts should not be dependent on any one tool

DDT spraying was the main instrument of attack. As resistance of mosquitoes to the insecticides emerged, the campaign ran into difficulties, while alternative ideas, such as mass chemotherapy, failed to catch on. DDT later fell into disrepute during the 1960s when it emerged that it accumulated in the food chain and was toxic to mammals.

In many malaria-endemic countries, the challenge of the disease is also greater now than in the years before the global eradication campaign. In India, insecticide resistance is rife, while sprawling urban and industrial development, and water resource development projects have created new breeding grounds for the mosquito.

Today's thinking largely avoids dependence on any one tool or approach. For example, the exclusive use of insecticide treated mosquito nets to the exclusion of the less environmentally correct use of insecticides in spraying houses, remains a danger. Thus the prevailing consensus is that integrated approaches, bringing a variety of tools to bear – depending on the particular situations – are best.

### 3. Maintenance of commitment to the goal: continuity of efforts and funding

After the global eradication campaign wound down, nearly two decades passed before malaria control found its way back on to the international political and health agenda. Meanwhile malaria efforts deteriorated in India and elsewhere. Any new global strategy must consider how national health services will consolidate and maintain gains made by a major effort.

With the eradication programme in difficulties, by 1969, economists, health administrators, malariologists and statisticians advised on declaring victory in those areas where success had been achieved. The goal of global eradication was abandoned in favour of controlling the disease in other regions. Momentum was lost, and funding declined as donors moved on to other priorities.

The malaria situation subsequently deteriorated in many countries, in particular in Latin America, southern Asia, India, and south-east Turkey, with the number of reported cases in these regions doubling from 1974 to 1977.

At the start of this eradication campaign, for example, 75 million people in India caught malaria annually and 800,000 died. By the end of the campaign, and after much DDT use, later, malaria had disappeared from 90 per cent of the territory, and new cases had dropped to around 100,000 annually. But by the end of the 1970s, new cases in India had climbed to 6.5 million annually, and today millions of cases and thousands of deaths occur. According to the Indian National Malaria Eradication Programme, a contributing factor to this new upsurge in malaria was the sudden withdrawal of support from major donors, in particular for insecticide purchase. The success of the early years led to complacency in India that malaria had been defeated.

### 4. Ownership

The lack of public understanding and support was a major obstacle to the success of the campaign. Many householders were not adequately informed of the goals and methods of the campaign, and subsequently refused to allow spraying of their houses, with consequent inadequate coverage.

<sup>30</sup> Litsios S. (1996). *The Tomorrow of Malaria*. Pacific Press: Ecotrends

<sup>31</sup> These amounts are based on the US Consumer Price Index of 29.2, 30.3 and 33.4 in 1959, 1962 and 1967, and of 189.4 in July 2004.

