

Coming to grips with malaria in the new millennium

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Foreword

The world has an unprecedented opportunity to improve the lives of billions of people by adopting practical approaches to meeting the Millennium Development Goals. At the request of the UN Secretary-General Kofi Annan, the UN Millennium Project has identified practical strategies to eradicate poverty by scaling up investments in infrastructure and human capital while promoting gender equality and environmental sustainability. These strategies are described in the UN Millennium Project's report *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*, which was coauthored by the coordinators of the UN Millennium Project task forces.

The task forces have identified the interventions and policy measures needed to achieve each of the Goals. In *Coming to Grips with Malaria in the New Millennium*, the Working Group on Malaria of the Task Force on HIV/AIDS, Malaria, TB, and Access to Essential Medicines proposes an operational framework for scaling up integrated packages of effective antimalarial interventions with the aim of improving health nationally while also promoting economic development locally—an emphasis that is echoed in *Investing in Development*. An integral part of this framework is building stronger national health systems as a platform for delivering essential antimalarial and other health commodities and services. This report highlights the importance of free provision of insecticide-treated bednets, application of residual insecticides, and provision of effective antimalarial medicines and diagnostics to those at risk of malaria. Adequate information systems for health and effective management skills at all levels of the health system are paramount to effectively allocating resources, monitoring program performance, and evaluating the extent to which the health-related Millennium Development Goals are realized.

Funding for malaria control remains far below the \$2–\$3 billion required per year to achieve the desired impact. Closing this resource gap is, however, possible with the combined efforts of donor nations and endemic countries.

This report has been prepared by a group of leading experts who contributed in their personal capacity and volunteered their time to this important task. I am very grateful for their thorough and skilled efforts and I am sure that the practical options for action in this report will make an important contribution to achieving the Millennium Development Goals. I strongly recommend it to anyone who is interested in the role of malaria control within a comprehensive development framework.

Jeffrey D. Sachs
New York
January 17, 2005

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Preface

The Millennium Declaration, adopted by world leaders at the United Nations Millennium Summit in September 2000, formed the basis for eight mutually supportive goals known as the Millennium Development Goals. Originating in a series of United Nations resolutions and agreements over the past decade, the Goals are intended to resolve the most important structural constraints impeding sustainable economic growth and hence social progress in developing countries. This concerted effort is directed at changing the course of policy in several key areas at all necessary levels to combat poverty, disease, illiteracy, gender inequality, and environmental degradation, particularly in the poorest and most vulnerable populations. For countries trapped in entrenched poverty, the Millennium Development Goals have highlighted health as a priority investment area in view of the fact that any progress on this front is mutually reinforcing and also contributes to better outcomes in the other Goals.

The Monterrey Consensus, adopted by a large group of countries at the International Conference on Financing for Development in 2000, elicited the commitment of countries to create an equitable global economic system by providing more extensive debt relief and improved market access to poor countries. This commitment is necessary to achieve the Millennium Development Goals.

The UN Millennium Project aims to identify the best strategies and the resources needed to achieve the Millennium Development Goals in all developing countries by the year 2015. To this end, 10 task forces have been established, each composed of scholars, policymakers, and practitioners from developed and developing countries affiliated with UN agencies, civil society organizations, public agencies, nongovernmental organizations, and private sector institutions. The task forces divided this work according to their expertise with the aim of consolidating synergies among the Goals to achieve an

integrated strategy by the year 2005. The UN Millennium Project Task Force on HIV/AIDS, Malaria, TB, and Access to Essential Medicines aims to devise a framework for accelerated implementation of strategies for achieving Millennium Development Goal 6: “Combat HIV/AIDS, malaria and other diseases.” It has four working groups focusing on these three diseases and access to essential medicines.

The Working Group on Malaria puts forward a global plan for scaling up country-level malaria activities and makes a number of recommendations that require priority action to achieve the working group’s proposed target on malaria: “Reduce malaria morbidity and mortality by 75 percent by 2015 from the 2005 baseline level.” A range of effective tools and interventions exist for the prevention, treatment, and control of malaria. However, coverage levels are unacceptably low in endemic countries. More importantly, interventions are not reaching those who need them most.

This report identifies key implementation challenges and resources required for accelerated implementation of integrated packages of effective antimalarial interventions designed to improve health nationally while also promoting economic development locally. The task force members agree that the public good will best be served by the free provision of insecticide-treated nets, application of residual insecticides, and provision of effective antimalarial medicines and diagnostics. An integral part of this global plan is building stronger national health systems as a platform for delivering essential antimalarial commodities and effective interventions to those at risk of malaria. Adequate health information systems and effective management skills are paramount to sustainable disease control efforts. Finally, a program of applied and basic research is required to develop a series of alternative medicines and insecticides, rapid and reliable diagnostic tools suitable for field use, and appropriate vaccines.

This document is intended for the governments of affected countries, donor nations, the private sector agencies, nongovernmental foundations, civil society organizations, nongovernmental organizations, and academic and research institutes. The task force members hope that this document will provide a useful framework for action and will stimulate an immediate response to the plight of people living in malaria-endemic areas.

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Abbreviations

ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
CGIAR	Consultative Group on International Agricultural Research
DDT	dichlorodiphenyltrichloroethane
DHS	Demographic and Health Surveys
DSS	Demographic Surveillance Systems
GFATM	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GIS	geographic information systems
GPS	global positioning system
HIS	health information systems
HIV	human immunodeficiency virus
IMCI	Integrated Management of Childhood Illness
IPTi	Intermittent Preventative Treatment in Infants
IRRI	International Rice Research Institute
IWMI	International Water Management Institute
MICS	Multiple Indicator Cluster Survey
MIM	Multilateral Initiative on Malaria
MIS	Malaria Indicator Survey
MMV	Medicines for Malaria Venture
NGO	nongovernmental organization
NMCP	National Malaria Control Program
OPID	Opération de Pulvérisation Intra Domiciliaire
PHAP	Public Health Action Plan
RBM	Roll Back Malaria initiative
SIMA	Systemwide Initiative on Malaria and Agriculture
SP	sulfadoxine-pyrimethamine
TB	tuberculosis

TEHIP	Tanzanian Essential Health Interventions Project
TRIPS	Trade-Related Aspects of Intellectual Property Rights
WHO	World Health Organization

goals

Millennium Development Goals

Goal 1

**Eradicate
extreme poverty
and hunger**

Target 1.

Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day

Target 2.

Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Goal 2

**Achieve
universal primary
education**

Target 3.

Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Goal 3

**Promote gender
equality and
empower women**

Target 4.

Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015

Goal 4

**Reduce child
mortality**

Target 5.

Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

Goal 5

**Improve
maternal health**

Target 6.

Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

Goal 6

**Combat
HIV/AIDS,
malaria, and
other diseases**

Target 7.

Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 8.

Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Goal 7**Ensure
environmental
sustainability****Target 9.**

Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

Target 10.

Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation

Target 11.

Have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers

Goal 8**Develop a global
partnership for
development****Target 12.**

Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction—both nationally and internationally)

Target 13.

Address the special needs of the Least Developed Countries (includes tariff- and quota-free access for Least Developed Countries' exports, enhanced program of debt relief for heavily indebted poor countries [HIPCs] and cancellation of official bilateral debt, and more generous official development assistance for countries committed to poverty reduction)

Target 14.

Address the special needs of landlocked developing countries and small island developing states (through the Program of Action for the Sustainable Development of Small Island Developing States and 22nd General Assembly provisions)

Target 15.

Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

Some of the indicators are monitored separately for the least developed countries, Africa, landlocked developing countries, and small island developing states

Target 16.

In cooperation with developing countries, develop and implement strategies for decent and productive work for youth

Target 17.

In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries

Target 18.

In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies

Executive summary

Malaria is a major global health problem; more than 50 percent of the world's population is exposed to the disease. An exact assessment of the extent of malaria's health burden is fraught with formidable challenges. The disease is estimated to cause 300–500 million episodes of acute illness and 1.1–2.7 million deaths worldwide every year. More than 90 percent of the world's malaria burden is in Africa. Malaria takes its greatest toll on young children and pregnant women. At least 20 percent of all childhood deaths in Sub-Saharan Africa can be attributed to the disease. Pregnant women are at great risk of malaria infection and may suffer a range of complications from anemia to cerebral malaria. These complications also affect the survival and development of their newborns.

Malaria control has been increasingly recognized as an integral part of a comprehensive development framework with a key role in poverty reduction. The disease has been estimated to reduce economic growth by more than one percentage point a year in highly endemic countries. The perceived risk of infection has been suggested to negatively affect decisions related to investment, trade, and crop choice and to impose sizeable longer term costs by slowing economic growth in malarious countries and widening the gap between them and the rest of the world. Malaria exacts its toll on agricultural communities and households living in rural tropical areas where subsistence economy persists. The malaria transmission season generally coincides with that of planting or harvesting. As a result, a brief period of illness that delays planting or coincides with harvesting may cause catastrophic economic effects in the world's poorest regions, deepening the impoverishment of rural agricultural households through direct output and income losses.

In the decades following the Global Malaria Eradication Program (1955–69) the geographic range of the disease contracted substantially, and political

Very few health gains have translated into sustained societal improvements in the lives of those living in malaria-endemic areas

commitment and resources allocated for malaria control and research dwindled. Malaria became a disease of the poor nations situated mainly in tropical areas, and malaria control programs degraded significantly or were abandoned entirely in afflicted countries. Since the 1980s and 1990s, the malaria conundrum has been exacerbated by the development and spread of resistance to effective and affordable antimalarial medicines and insecticides and by the general weakening of health systems. The situation is compounded by the frequent occurrence of epidemics and complex emergencies.

Following the global resurgence of the disease, the Roll Back Malaria (RBM) initiative was launched in 1998 by the World Health Organization in partnership with the World Bank, the United Nations Children's Fund, and the United Nations Development Programme. RBM has been instrumental in creating global awareness and political commitment for malaria control. Both malaria-endemic countries and the international donor community expressed their readiness to embark on sustainable control efforts at a national scale. However, five years after launching the RBM initiative, country-level implementation of malaria control efforts has been severely limited because of a lack of resources for large-scale procurement of essential health commodities such as antimalarials, insecticide-treated nets, and insecticides. The growing HIV/AIDS pandemic has also overstretched the already limited resources available for malaria prevention and control in the past decade, particularly in Africa.

Overall, despite a series of declarations on malaria, pledges by global partners, and advances in the development of antimalarial tools over the past five decades, very few health gains have translated into sustained societal improvements in the lives of those living in endemic areas, particularly in Africa south of the Sahara. Since 2002 the situation has improved with an influx of additional resources for malaria control from the Global Fund to Fight AIDS, Tuberculosis, and Malaria. Over the last four rounds of country proposals, the Global Fund has stepped up its support by allocating about \$450 million per year to malaria control and has created optimism and resolve among endemic countries to implement malaria control on a national scale. This is an encouraging start; however, more resources must be mobilized to meet the estimated need of \$2–\$3 billion per year for scaling up the response to malaria.

The Working Group on Malaria puts forward a global plan for scaling up country-level malaria control programs in endemic countries and makes a number of recommendations that require priority action to achieve the working group's proposed target for malaria: "Reduce malaria morbidity and mortality by 75 percent by 2015 from the 2005 baseline level." At the core of an operational framework is the implementation of integrated packages of effective antimalarial interventions designed to improve health nationally while also promoting economic development locally. Although this objective applies throughout the world's tropics, the need is particularly urgent in Sub-Saharan Africa.

A range of effective antimalarial tools and interventions exist for the prevention, treatment, and control of malaria

To this end, an integral part of this global plan is building stronger national health systems as a platform for delivering essential antimalarial commodities and effective interventions to those at risk of malaria. The public good will best be served by the free provision of insecticide-treated nets, application of residual insecticides, and provision of effective antimalarial medicines and diagnostics. Adequate information systems for health and effective management skills at national and district levels must complement provision of essential antimalarial commodities and services to ensure sustainability of disease control efforts. African countries, because of their marginalized position in the world economy and the scale of the malaria problem, are particularly vulnerable to any failure on the part of the international donor community to provide the necessary financial assistance.

A range of effective antimalarial tools and interventions exist for the prevention, treatment, and control of malaria. The components of a national malaria control strategy may include use of insecticide-treated nets; application of indoor residual spraying; early diagnosis of clinical infections; treatment with effective antimalarials; intermittent preventive treatment of pregnant women; management of the environment; improved housing; increased health education and awareness; epidemic forecasting, prevention, early detection, and control; and improved monitoring and surveillance systems and evaluation of program implementation. These interventions—if adapted to district- and village-level situations, implemented with sufficient intensity and coverage, and sustained on a national scale—will greatly reduce malaria morbidity and mortality and should promote economic growth. With adequate financial assistance, it is feasible to scale up access to interventions and increase low coverage levels to more than 80 percent in three to four years. Specifically, insecticide-treated bednets should be distributed to all children in malaria-endemic areas by 2007 to achieve 100 percent coverage. Such a comprehensive strategy would promote cognitive development and school attendance of young children. Finally, a program of applied and basic research is required to develop a series of alternative medicines and insecticides, rapid and reliable diagnostic tools suitable for field use, and appropriate vaccines.

The Working Group on Malaria has identified the following set of critical issues for priority action:

1. Establish a realistic and measurable target on malaria

Because the established Millennium Development Goal target on malaria, “Have halted by 2015 and begun to reverse the incidence of malaria” is difficult to measure and interpret, the Working Group on Malaria proposes a more measurable target. The revised target is recommended to be: “Reduce malaria morbidity and mortality by 75 percent by 2015 from the 2005 baseline level.” The proposed target and timeline are consistent with the Millennium Development Goals for improved maternal health and reduction of child mortality, because children under five years of age and pregnant women are the most vulnerable to malaria.

**Ministries of
health need
long-term
predictable
commitments
of funding
from the
international
donor
community**

2. Enhance commitment at country and global levels

Ministries of health should concentrate on their stewardship role by strengthening their planning, analytical, and public health expertise. Adequate human and financial resources should be dedicated to the pursuit of antimalarial interventions and the development of rationales for persuading other governmental agencies to join in this effort. Ministries such as agriculture, trade, mines, education, and finance are likely partners in malaria control. Such intersectoral collaborations are strengthened greatly when elements of the private sector such as philanthropic organizations and various industries (such as oil and mining) are included. Endemic countries should incorporate malaria control activities into their poverty reduction strategies.

Governments should promote the use of essential antimalarial intervention tools such as medicines, insecticides, insecticide-treated nets, and indoor residual spraying. Such public goods should be available free of cost to populations at risk for malaria. These efforts will require donor community participation to mobilize resources, as malaria-endemic countries cannot afford to implement these programs on their own. At the same time, measures should be adopted that will ensure the appropriate use of financial and other resources dedicated to malaria control interventions. Requirements for transparency should be imposed on agencies that are the recipients of such resources.

3. Strengthen health systems at national and district levels

Ministries of health need long-term predictable commitments of funding from the donor community to strengthen the healthcare infrastructure in endemic countries to provide quality laboratory services that will ensure reliable diagnosis and effective case management. Efficient mechanisms will also be required for procurement and distribution of medicines, reagents, insecticides, and other essential commodities, and for developing service delivery models coordinated with other health programs and effective health information and monitoring systems. These information systems would identify the most pressing health problems that can be addressed by existing technologies and also promote appropriate allocation of existing funds. Information systems for health should be modernized and strengthened and, as resources for health increase, should integrate community-level as well as facility-level data in a cohesive manner. Such comprehensive health information systems will enable planning, resource allocation, and tracking program performance through monitoring and evaluating process, outcome, and impact indicators. These systems are also essential for monitoring and evaluating program performance, assessing the equity of health systems, and evaluating the extent to which the Millennium Development Goals are realized.

4. Develop human resources for program implementation

Skilled personnel are required at national and district levels to assess local situations, develop appropriate intervention strategies, guide control activities,

**Essential
antimalaria
commodities
should be
provided free
of charge to
those at risk**

and monitor their impact. Human resource constraints should be addressed through an appropriate combination of incentives, legislative measures, and management reforms. Motivated staff should be retained with salary supplements and hardship allowances, and housing should be provided for those working in rural areas where the malaria challenge is most pressing. Such incentives may also slow the exodus to other countries of professionals seeking better opportunities

Training is critically required in epidemiology, entomology, laboratory diagnostics, and case management. Materials and tools that would enhance supervision, planning, and program management should be developed and produced. Existing regional malaria training centers and networks should be encouraged to produce midlevel malaria professionals knowledgeable in malaria prevention and management. These midlevel professionals should also be able to implement malaria control activities effectively and promote advocacy and community participation. Current training programs, especially in Africa, lack mechanisms to track certificate holders. Monitoring and evaluation are keys to the enhancement of the quality of work at the community level.

5. Promote social mobilization and community participation

Systems should be put in place for mobilizing communities and encouraging community participation in malaria planning and control activities. Because a large majority of the population at risk in Sub-Saharan Africa lacks access to formal health services, extension health workers, traditional birth attendants, and community health agents have a central role in the prevention and treatment of malaria. Community participation in planning and implementing malaria control efforts should be supported as an integral part of an effective district health system. The process should include establishing new health centers and health posts as part of the district health system.

6. Provide effective antimalarial supplies and commodities

Antimalarial medicines, insecticide-treated nets, and insecticides for indoor residual spraying (mainly DDT and pyrethroids) should be considered public goods and should be available free of charge to residents of endemic sites.

7. Apply an integrated package of interventions

There is no single antimalarial “magic bullet” that can bring about a sustained reduction in the malaria burden. A combined set of locally adapted interventions should be used because the cycle of malaria transmission is composed of many components that vary greatly from place to place. This package of interventions includes use of insecticide-treated nets; the application of indoor residual spraying; early diagnosis of clinical infections; treatment with effective antimalarials; intermittent preventive treatment of pregnant women; management

**Antimalarial
intervention
strategies
should also
promote
social and
economic
development**

of the environment; increased health education and awareness; epidemic forecasting, early detection and control; and improved monitoring and surveillance systems and evaluation of program implementation. The Working Group on Malaria endorses the Quick Wins initiative described in the UN Millennium Project's (2005) *Investing in Development*, which recommends immediate scale-up of high impact interventions that do not require complex infrastructure to implement. Among these Quick Wins is the recommendation that insecticide-treated bednets be distributed to all children in malaria-endemic areas by 2007. Because of the tremendous potential to save lives, especially in Sub-Saharan Africa, the working group believes that the target of 100 percent insecticide-treated bednet coverage among children should be an urgent international priority. In addition, intersectoral activities such as housing improvement, agricultural modification, water resource development, and road construction should complement these malaria-directed interventions.

8. Scale up malaria control efforts to national level

At present, malaria control efforts are conducted as relatively small projects with limited coverage and scope. Because they tend to be fragmented and uncoordinated, these efforts have had little impact on the resurgence of malaria. Improving efficiency and use by expanding primary healthcare services and eliminating constraints and inadequacies are required. Control efforts should be intensified and coverage extended to include all malaria-endemic sites globally. Community-based interventions should constitute an important element in the universal strategy. Ministries of health need major donor support to scale up investments in general health systems improvement and malaria control to achieve the health-related Millennium Development Goals.

9. Promote social and economic development

Although the main objective is to reduce malaria-related mortality and morbidity, antimalarial intervention strategies should also promote social and economic development. Sustainability requires strategies designed to eliminate transmission in those sites that potentially generate wealth or that may promote social development. Wealth-generating sites include those that are devoted to tourism, mining, and manufacturing industries as well as port facilities. Social development is promoted in schools and administrative centers.

10. Incorporate malaria prevention and treatment approaches into school curricula

Instruction devoted to appropriate malaria-related material should be incorporated into the curricula of health-related schools (those devoted to medicine, nursing, or sanitation) as well as schools devoted to agriculture, water resources, and civil engineering. Such material should also be included in primary, secondary, and vocational schools.

Increased development assistance is needed to realize the Millennium Development Goal target for malaria

11. Develop surveillance systems for early detection of malaria epidemics

The increasing trend of large-scale malaria epidemics in the world requires the development of improved methods for epidemic forecasting, prevention, and early detection. Development of malaria surveillance systems is crucial for epidemic preparedness and effective response in epidemic-prone areas. Multisectoral approaches reinforce effective development of early warning systems and should be supported.

12. Promote partnerships for malaria control

Existing malaria partnerships link ministries of health with representatives of UN and donor agencies but provide limited opportunity for participation by other governmental sectors. Civil society, faith-based organizations, and the private sector are generally not included. Country-level partnerships should, therefore, include these nontraditional members, and the activities of these partner groups should be conducted under government ownership and leadership.

While some countries have set goals and targets in line with the health-related Millennium Development Goals, they are unlikely to achieve them on their own unless there is massive and sustained increase in development assistance from developed countries in order to help build national capacity for the successful large-scale implementation of programs in affected countries.

13. Secure affordable access to the latest medical and therapeutic discoveries

Development of sound policies to address the threat to health security due to the sharp increase in the prices of medicines and other commodities is required. To protect the poor nations from such a threat, such policies should envision a national patent regime to secure affordable access to the latest medical and therapeutic discoveries. Commitment is also required from the international community to alleviate the restrictive features of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement in its application to the health sector.

14. Invest in research and development on malaria control tools

Safe and affordable antimalarial medicines for case management, as well as other medicines suitable for prophylactic use or intermittent preventive treatment of pregnant women and their young children, are lacking. Because *P. falciparum* is increasingly losing its susceptibility to chloroquine and sulfadoxine-pyrimethamine (SP), such effective therapies as those based on artemisinin (that is, ACTs) or other novel effective antimalarials recommended by WHO should be made available for treating uncomplicated malaria. Strong financial support will be required for developing and testing new antimalarial

medicines. Large-scale cultivation in Africa of the plant that is the source of artemisinin, *Artemisia annua* (annual wormwood), and a process for safely extracting and formulating the active ingredient should be supported and subsidized.

Development of new or improved diagnostic methods that are simple, reliable, and readily applicable in the field should be supported.

The availability of antimalarial vaccines is long overdue; vaccines suitable for use by long-term residents of endemic sites and others for use by transient residents are required.

Antivector methods effective against adult as well as larval mosquitoes should be improved, and new classes of insecticides developed.

Basic and operational research should be conducted for malaria epidemic forecasting, prevention, early detection, and rapid response.