A global strategy for malaria control
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World Declaration on the Control of Malaria 26
During the late 1980s, it was noted at several international meetings that the malaria situation in some parts of the world was seriously worsening. In tropical Africa, which had never been involved in the global malaria eradication campaign from 1955 to 1969, the disease continued to be the cause of an estimated one million childhood deaths per year; the mainstay of control, early chloroquine treatment of fever attacks, was in jeopardy because of increasing drug resistance; and in highland and desert-fringe areas, epidemics were killing thousands of people in all age groups. At the same time, the complex problems of multi-drug-resistant falciparum malaria in frontier areas of development in South-East Asia and South America clearly warranted concerted intervention supported by field research. It was felt that most of the countries affected needed far more technical and financial support for combating malaria than they had been receiving since 1969.

In consequence, it was proposed at a meeting of WHO’s Executive Board in 1990 that a Ministerial Conference on Malaria should be held to mobilize affected countries and the international community to intensify disease control efforts. WHO received financial and organizational support for the proposed conference from a large number of Member States, agencies and organizations.

In preparation for the conference a number of international consultations took place, the most important being interregional conferences in Brazzaville in 1991 and in New Delhi and Brasília in 1992. At these conferences, with a total of nearly 400 participants, health officers responsible for national malaria programmes and representatives of donor agencies, research institutions and the United Nations and its specialized agencies discussed all aspects of malaria control. The main result was the synthesis of consensus opinions on current standards for malaria control and the formulation of a Global Malaria Control Strategy. This Strategy was presented at the Ministerial Conference,
which took place in Amsterdam from 26 to 27 October 1992 under the presidency of Professor Pascal Lissouba, President of the Republic of the Congo, with the participation of ministers of health and other health leaders from 102 countries, as well as representatives of the United Nations and related organizations, other intergovernmental organizations and the scientific community.

The Global Strategy received the support of the Ministerial Conference, which recommended minor changes to its text; it is presented here as amended and endorsed by the Conference. The Ministerial Conference went on to adopt the World Declaration on the Control of Malaria (see Annex). In so doing, participants expressed the strongest possible commitment to work together in implementing the Global Strategy, to alleviate the intolerable burden of malaria wherever it occurs. The World Declaration was further endorsed in May 1993 by the Forty-sixth World Health Assembly, which requested the Director-General of WHO “to ensure...the necessary technical support...to Member States for the preparation or reorientation of malaria control programmes according to the Global Malaria Control Strategy and for their implementation in the context of primary health care”.

The Global Strategy calls for rational use of existing and future tools to control malaria. It recognizes that malaria problems vary enormously from epidemiological, ecological, social and operational viewpoints, and that sustainable, cost-effective control must therefore be based on local analysis. Based on decades of lessons from practice, the Strategy is firmly rooted in the primary health care approach, and calls for the strengthening of local and national capabilities for disease control, for community partnership and the decentralization of decision-making, for the integration of malaria control activities with related disease programmes, and for the involvement of other sectors, especially those concerned with education, agriculture, social development and the environment. It emphasizes the vital importance of continuing malaria research, locally and internationally, and of international teamwork in both control and research.

This publication should be of interest far beyond the circles of malaria specialists. Its most important role may be as a reference for general health planners in countries affected by malaria and those responsible for other disease control programmes. It should be used as a basic guide to malaria control by those responsible for health in international, bilateral and nongovernmental agencies and organizations and also remind them of the commitment they made in Amsterdam in 1992. Finally, it should be used to mobilize governments and all sectors whose work relates to health to work together for malaria control.
The time has come for a renewed attack on malaria. Every year, malaria causes clinical illness, often very severe, in 300–500 million people and over a million people die from it. It threatens 2200 million persons, about 40% of the world’s population, undermining the health and welfare of families, endangering the survival of children, debilitating the active population and straining both countries’ and people’s scarce resources.

Yet malaria is a curable disease, not an inevitable burden. The vastly expanded knowledge of the disease and its control acquired over the years provides a basis for launching a new global initiative for malaria control. Malaria can be curbed with present tools by local health systems, as some countries have shown.

In most endemic countries, the goal of malaria control will be to prevent malaria mortality and to reduce morbidity and the socio-economic losses provoked by the disease. The goal in malaria-free areas will be to maintain that freedom.

Success in achieving these goals depends on political support from the highest level. It also depends on a change in emphasis from highly prescriptive, centralized control programmes to flexible, cost-effective and sustainable programmes adapted to local conditions and responding to local needs. This requires the progressive creation of national and local capacities for assessing malaria situations and selecting appropriate control measures that are aimed at reducing or preventing the disease problem in the community rather than being concentrated on reducing parasite rates in the population, as was too often the case in the past.

In some countries, the development of disease-oriented malaria control programmes has started, but in others too little is being done,

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1 These figures are based on estimates prepared in 1993 (after the Ministerial Conference on Malaria).
or malaria control programmes persist with inefficient practices based on eradication principles. In the great majority of countries, eradication is not a realistic goal.

Malaria control is not the isolated concern of the health worker. It is everybody's business, and everyone should contribute. It requires the partnership of community members and the involvement of those engaged in education, the environment in general, and water supply, sanitation and community development in particular. Malaria control must be an integral part of national health development and health concerns must be an integral part of national development programmes in general.

Community-based action for malaria control must be sustained and supported by intersectoral collaboration at district, national and international levels, by monitoring, training and evaluation, and by operational and basic research. Local situation appraisal and action need global support. The time has come for governments and the international community to make a commitment to control the disease by developing personnel, by investing the necessary resources and by reorienting programmes where necessary, and to tackle the problem in a cost-effective and sustainable way. Once this strategy is implemented, better and more efficient use of resources will over time achieve the ultimate objective of malaria control: the prevention of death and reduction of suffering from malarial disease.

The objectives of the Global Malaria Control Strategy are to prevent mortality and to reduce morbidity and social and economic loss due to disease through the progressive improvement and strengthening of local and national capabilities. The four basic technical elements of the Strategy are:

- to provide early diagnosis and prompt treatment;
- to plan and implement selective and sustainable preventive measures, including vector control;
- to detect early, contain or prevent epidemics; and
- to strengthen local capacities in basic and applied research to permit and promote the regular assessment of a country's malaria situation, in particular the ecological, social and economic determinants of the disease.

The Strategy does not propose a single solution but gives broad lines of approach to achieving a common aim. The approaches are to be adapted by the countries concerned according to the structures of their
health systems and existing control operations, their resources and a realistic assessment of control needs and risk factors.

Affected countries will need technical and financial support of the international community. The Strategy outlines the roles of governments and international institutions in a partnership for coordination and technical cooperation necessary to ensure continuity of action and unity of purpose. WHO is ready to join in that partnership, which serves the health, social and economic interests of malarious and malaria-free countries alike.
Figure 1. Malaria distribution and problem areas

Central America
Agricultural development, irrigation schemes and colonization, combined with insecticide resistance, have caused renewed increase in malaria.

Dry savanna and desert fringe
Epidemics related to exceptional rains and population movements. Over 50,000 cases in Khartoum during the floods of 1988.

Ethiopia
Repeated epidemics in highlands due to degraded environment, drought and famine, and large-scale resettlement schemes.

Afghanistan
Over 300,000 cases recorded per year. Interruption of control and displacement of populations due to war.

Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam
Over 500,000 cases recorded yearly. Rapidly increasing risk in frontier areas of economic activity with often illicit mining and civil unrest. Most severe drug resistance in the world.

Papua New Guinea, Philippines, Solomon Islands and Vanuatu
Over 500,000 cases recorded yearly, related to colonization of new areas.

Amazonian rain forest
500,000 cases per year in Brazil (50% of malaria in the Americas), and an estimated 6,000 to 10,000 deaths due to new settlement and mining in forest areas.

African cities
Severe drug resistance, increasing deaths in young adults. Inadequate sanitation, overburdened services.

African savanna and forest
Over 50% of the population infected. Malaria is main cause of death in young children, killing 1 in 20 before age 5. Increasing chloroquine resistance.

East African highlands and Madagascar
Dramatic epidemics related to changed agricultural patterns, interruption of control, and possibly increased temperatures. Over 25,000 deaths in Madagascar in 1988.

Middle South Asia
Over 2 million recorded cases per year. Increasing numbers in tribal, forest and hill areas, sometimes reaching epidemic proportions.

Main areas where malaria transmission occurs
Circled areas represent islands where detail cannot be shown.
1

The present malaria situation

Globally, the malaria situation is serious and getting worse (Fig. 1). The countries of the world affected by malaria today can be classified with respect to malaria control priorities into two major categories: those that were not included in the efforts of the global malaria eradication programme to end the transmission of infection (Category I), and those that were and in which large-scale programmes of house-spraying with insecticides have been in operation since the 1950s or 1960s (Category II).

Most countries in Category I are in Africa south of the Sahara. In these countries, about 550 million people are at risk from malaria, with an annual total of 250-450 million clinical cases of disease and over a million deaths. These figures account for over 80% of the cases of malarial disease in the world. Some of the most severe malaria epidemics in recent years have taken place in highland areas in Africa, the most serious being the epidemic that claimed about 25,000 lives in Madagascar in 1988.

In Africa, malaria is responsible for about 10% of hospital admissions and 20–30% of outpatient consultations. Children are particularly at risk of disease, malaria being one of the major childhood killers in rural tropical Africa, taking the life of one out of 20 children before the age of five years. The disease causes anaemia in children and pregnant women and increases vulnerability to other diseases. Malaria is also a major cause of school absenteeism. In young adults in Africa, malaria is still one of the most common diseases, and it tends to strike at the time of year when agricultural work is at its height. In 1987, the estimated annual direct and indirect cost of malaria in Africa was US$ 800 million and this figure is expected to rise to more than US$ 1800 million by 1995.

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1 These figures are based on estimates prepared in 1993 (after the Ministerial Conference on Malaria).
The countries in which eradication was attempted in the past 20–35 years are mainly in Asia and the Americas. The total number of cases recorded from these areas is now approximately five million per year. It is estimated, however, that the real number is nearly four times as high. About 80% of these cases are found in Asia, where – except in China – the situation is worsening, particularly in the Indochinese peninsula, which is affected by extremely severe problems of parasite resistance to drugs. No progress in malaria control has been observed in the endemic countries of the Indian subcontinent during the past few years. It is estimated that malaria claims more than 100,000 lives per year outside Africa; these deaths occur in all age groups.

Although most of the populations in Asia and the Americas now live in areas where the risk of malaria is relatively low, there is a serious problem in frontier areas of economic development and in countries affected by social disruption. In these areas, environmental disturbances, movements of underprivileged populations and the absence of health care infrastructure have been responsible for malaria problems in parts of the world where the disease was otherwise under a measure of control. Thus, two-thirds of the cases of malaria in the Americas occur in the Amazon basin as a result of colonization and mining of the forest environment. In Asia, control efforts have been thwarted by war in countries such as Afghanistan and Cambodia.
2
The Global Malaria Control Strategy

Since malaria varies throughout the world, no single prescription can be made for the control of malaria in all countries. On the contrary, each country's circumstances will influence the organization of practicable programmes to identify local problems and priorities and to design and implement appropriate interventions. The key is competent local action.

The goal of malaria control is to prevent mortality and reduce morbidity and social and economic losses, through the progressive improvement and strengthening of local and national capabilities.

The four basic technical elements of the Strategy are:

- to provide early diagnosis and prompt treatment;
- to plan and implement selective and sustainable preventive measures, including vector control;
- to detect early, contain or prevent epidemics; and
- to strengthen local capacities in basic and applied research to permit and promote the regular assessment of a country's malaria situation, in particular the ecological, social and economic determinants of the disease.

Effective implementation of the Global Strategy requires:

- sustained political commitment from all levels and sectors of government;
- malaria control to be an integral part of health systems, and be coordinated with relevant development programmes in non-health sectors;
- communities to be full partners in malaria control activities; and
- the mobilization of adequate human and financial resources.

Given the paucity of resources in Category I countries, the priority in these areas should now be to focus on the good management of
Table 1. Priorities for strengthening malaria control programmes

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<th>Structural component</th>
<th>Category I countries</th>
<th>Category II countries</th>
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<td>Funding</td>
<td>Substantial increase needed, but within overall health planning.</td>
<td>Modest investments can lead to better cost-effectiveness and long-term savings.</td>
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<tr>
<td>Collaboration with general health services</td>
<td>Implementation of malaria control mainly through general health services. Disease management may need to be extended beyond coverage of existing formal health services.</td>
<td>Programme capabilities should be used to strengthen general health services, to enable them to take full responsibility for disease management.</td>
</tr>
<tr>
<td>Epidemiological information system</td>
<td>Must be strengthened, initially by use of hospital and sentinel data. Local analysis of data by general health services needed.</td>
<td>Must be based on general health services data. Must be used dynamically for targeting intervention.</td>
</tr>
<tr>
<td>Special services for vector control</td>
<td>May need to be established in some countries with risk of epidemics. Special technical, managerial and logistic support needed if impregnated nets are to be used.</td>
<td>Need to be trimmed and better managed. Improved targeting of activities needed. In some areas, impregnated nets should be adopted instead of house-spraying.</td>
</tr>
<tr>
<td>Intersectoral collaboration</td>
<td>Requires technical strengthening of control programmes, involvement of relevant sectors in planning, increased awareness in different sectors and high-level political commitment.</td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>More required. Training needed in epidemiology, management and operational research.</td>
<td>Increase needed in ratio of qualified professional to intermediate-level and unskilled staff.</td>
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malarial disease as the foundation for developing malaria control programmes through the general health services.

In Category II countries, disease prevention activities, which include vector control, need better targeting to provide effective and sustainable protection for the population. Most of these programmes are in urgent need of reorientation and restructuring; disease management must receive renewed emphasis and become an integral part of the work of the general health services.

In both categories of countries, a number of situations of special risk occur, sometimes threatening specific population groups, sometimes leading to epidemics. These demand particular attention.

An outline of the main points to be considered for strengthening malaria control programmes is given in Table 1.
Malaria control activities

Disease management

Early diagnosis and prompt treatment — disease management — are fundamental to malaria control. They are a basic right of the affected populations and need to be available wherever malaria occurs. Populations at special risk of malaria must be identified and specifically defined so that diagnosis and treatment facilities can be focused and prompt management of disease ensured. Children and pregnant women, on whom malaria has its greatest impact in most parts of the world, are especially important.

National antimalarial drug policies are needed by all countries. These policies should take into consideration: epidemiological factors that affect the aims of therapy, such as the geographical distribution of the parasite and its degree of resistance to the drugs; the characteristics of the health services, including the private sector; the levels of the health service at which treatment with different drugs will be offered; and the risks and benefits of different drug regimens, compliance with them and their cost.

No universal formula for the management of malarial disease can be offered that could be applied in all countries of the world. As a general principle, health ministries should aim at a policy of diagnosis and treatment that minimizes mortality, morbidity and the development of drug resistance, while keeping within the limits imposed by their budgetary and staffing constraints.

Health ministries should also ensure that all health care providers, whether public or private, are fully cognizant of ministry policies and their rationale. When variations in ministry policies are introduced, they should be consistent with that rationale.

The difficulty of diagnosing malaria with certainty if blood slides cannot be promptly examined by a skilled microscopist makes it necessary to develop practical guidelines for the management of
patients with fever by people at different levels of health care. Such
guidelines should specify criteria for the use of particular drugs,
standardized treatment regimens, measures for general supportive
care, criteria for referral and requirements for laboratory evaluation.
They will determine which antimalarial drugs are needed, the quanti-
ties required and their distribution.

Referral services should be able to diagnose malaria microscopi-
cally, preferably at the first referral level. Diagnosis by microscopy is
needed to identify the species involved, to confirm a clinical diagnosis
— especially of severe and complicated malaria or of treatment failure —
and to guide or monitor the management of patients. It can help to
minimize a patient’s exposure to drugs that may have adverse effects
and to direct expensive drugs to the patients who most need them.

Governments are responsible for assuring the quality of the drugs
needed for treatment and their availability and affordability. This can
be facilitated by the procurement and distribution of generic drugs.
Decisions on registering and introducing new drugs should be based
on a well documented need for them.

The ever-increasing resistance of malaria parasites to drugs is a
matter of great concern. Treatment failures must, therefore, be moni-
tored and investigated to determine the frequency, degree and distribu-
tion of drug resistance. Such information is needed for the periodic
review of antimalarial drug and treatment policies and their modifica-
tion as appropriate. The methods and approaches used for monitoring
drug susceptibility should be as simple as possible to ensure the
widespread collection of the information required.

In general, malaria control services should ensure the quality of
disease management within the general health services, as well as the
correct use of the services by the affected population. They should
provide the community with information on the risks of malaria, its
prevention and action to be taken when infection occurs. Official and
unofficial drug providers should be furnished with understandable
information on the use of antimalarial drugs and the importance of
ensuring that patients take the full curative dose and seek immediate
competent care in the event of continued illness.

Disease prevention

Prevention of malarial disease encompasses a variety of measures that
may protect against infection or against the development of disease in
infected individuals. Measures that protect against infection are di-
rected against the vector mosquitoes and can be classified as either
personal protection, aiming at protecting individuals or households against infective bites, or transmission control, aiming at reducing the risk of malaria to entire communities or populations. Measures for protecting against disease without preventing infection include immunization (still at the experimental stage) and chemoprophylaxis. It must be emphasized that the efficacy of any preventive measure should be gauged from the incidence of malarial disease and its effects.

**Personal protection**
A degree of individual and collective protection can be obtained by a variety of means: protective clothing, repellents, screening of houses, insecticide-impregnated bednets and the like. Bednets impregnated with pyrethroid insecticides have been well received and shown to give protection in some areas of Africa, the Americas, Asia and the Pacific.

**Immunization and chemoprophylaxis**
Immunization against malaria may become possible in the future. Although some vaccines have been tested in the field, they are still at an early stage of development. Even when available for utilization, it is expected that they will be applied, not as the sole solution to the malaria problem, but as a component of strategies that include other measures.

The difficulty of ensuring that people strictly follow prescribed regimens of antimalarials and the increase in drug resistance have reduced recourse to the use of drugs for chemoprophylaxis. As a control measure, chemoprophylaxis is no longer recommended for young children or other large groups, except for temporary use in special circumstances. Chemoprophylaxis remains desirable for pregnant women, but it is necessary to weigh the risks, costs and benefits of the available drugs in each local situation. A combination of personal protection and chemoprophylaxis is to be encouraged for non-immune migrant labourers, soldiers, police and similar groups working in strictly controlled situations.

**Vector control**
The measures available for control of transmission include the use of chemical insecticides and biological agents and environmental management. Of these, reliance has so far mainly been placed on spraying with residual insecticides. In the right circumstances, this can be
highly efficacious; but the proper use of insecticides is a complex
matter, involving considerable expense and trained personnel and
demanding sustained application, usually for many years.

A necessary first decision to be made, therefore, is whether to
continue with (or embark upon) large-scale vector control. It should
be considered in areas where it will be both cost-effective and cost-
beneficial, and where environmental and social conditions, as well as
the development of services for disease management, will allow the
gains to be maintained. This implies careful analysis of the epidemi-
ological situation, the outcome expected, the human resources and
funds that can be allocated or reallocated for the work and the long-
term sustainability of the operations.

Malarious areas should be carefully delineated in order to identify
the situations in which there is a priority need to resort to vector
control and to select appropriate methods. The available methods
differ widely in nature, in the level and duration of their efficacy and
in their site-specificity, i.e. their appropriateness to local malaria
situations. Selectivity is essential, both in deciding whether and where
to attempt vector control and, if the decision is to do so, in determining
the particular method or methods to use.

The selection must be based on adequate knowledge of the vectors
concerned and the relevant environmental, ecological, social, eco-

oneic and health-service features. Expertise in all these areas should
be drawn upon when preparing national guidelines for decision-
making about the use of the vector control.

In some countries, the extent and cost of spraying operations have
been reduced without an increase in malaria infection by a gradual shift
to well-targeted spraying of priority areas identified through effective
information systems.

Environmental management can reduce or eliminate mosquito
breeding sites. It should be more often applied by local communities
for collective protection from vectors and be incorporated into the
planning of development projects. Its incorporation into development
activities requires collaboration between the health sector and those
involved in development, agriculture, water supply and other relevant
activities. At the same time, budgetary provision needs to be made for
the action required, including maintenance. National and interna-
tional bodies supporting development activities should be, and often
are, aware of the need for careful environmental planning and manage-
ment.
Prevention and control of epidemics

Malaria epidemics occur when populations with little immunity are exposed to high-intensity transmission. Highland, forest and desert-fringe areas are particularly likely to experience epidemics, especially when affected by ecological disruption. Epidemics also occur in areas of social, economic and political instability where basic services have disintegrated or do not exist. Unfortunately, most malaria control programmes with centralized structures are not designed to detect or react quickly to emergencies. Often an aberrant situation is first reported by peripheral authorities outside the health sector. There is an urgent need to strengthen the capacity for early detection of epidemics and to speed up the communication between the peripheral health services and the staff of the control programme. Ignorance and lack of supervision of programme staff in areas where basic services do exist can lead to the exacerbation of epidemics.

Areas prone to epidemics can be identified by epidemiological stratification that takes account of vectorial transmission capacity, environmental (including meteorological) conditions, social and economic conditions, population migration patterns and other factors. Local health services have much to contribute to this process, and should be the first to report a suspicious increase in the number of patients with fever. On the basis of this stratification, a limited set of indicators of epidemic potential or risk factors can be prepared that can be monitored by local health personnel and used to build up community preparedness and prevention.

Contingency plans should also be worked out according to the most probable risk situations, and resources that could be rapidly mobilized should be identified. Emergency relief organizations should include malaria in their planning so that, in collaboration with the regular services, they can deal with epidemics occasioned by natural disasters or other urgent situations that involve sudden, large population movements.

A basic preparedness measure is to establish a central reserve of drugs, insecticides and spraying equipment that should be permanently maintained for rapid deployment should an epidemic arise.

The epidemiological basis of malaria control

Assessment and analysis of local malaria problems are a prerequisite for embarking on any control activity. An appropriate epidemiological information system is therefore an essential part of a control programme.
Epidemiological information should include not only morbidity and mortality data, but also information on underlying factors relating to the human population, the parasite, the vector and the ecosystem and on the impact of malaria.

The status of health services and of existing vector control activities should also be taken into account in planning, as should the constraints and opportunities posed by resources and the physical and administrative infrastructure.

**Major epidemiological types**

In each local situation, an examination of epidemiological and operational aspects of the malaria problem is required. This has been the basis of stratification as traditionally applied to determine appropriate control approaches in different areas of many countries. Practical experience accumulated over many years has shown that this process can be simplified. On the basis of easily recognizable ecological and social characteristics, most malaria situations in the world can be identified as falling within a few major epidemiological types. For each of these, certain risks are particularly important, and certain approaches to control are more likely to succeed than others. Planning of malaria control for a given area should therefore start with identification of the epidemiological types within it. This should be followed by collection of information relevant to the particular risks and to the control approaches that might be realistic.

The major epidemiological types recognized in contemporary malaria control practice are presented in Table 2.

**Epidemiological information systems**

Epidemiological information systems are essential in all malaria control programmes. Their principal purposes are:

- Regular reassessment of a country's malaria situation, in particular the ecological, social and economic determinants of the disease. This will allow the forecasting or detection of epidemics, definition of risk groups, and identification of problems in programme implementation that require intervention.

- Monitoring of programme progress and evaluation in relation to epidemiological objectives and operational targets.
To be efficient and effective, disease control programmes should be continuously monitored and evaluated. These activities will indicate where improvements and adjustments are needed, identify priority areas for action or groups at risk, and expose problems that need to be solved by more closely focused studies. The design of epidemiological information systems should be intimately related to the objectives and expected outcomes in programme planning. The information must reflect the special risks identified in the planning stage and be sensitive to the factors that could cause particular problems. Finally, a realistic assessment should be made of what valid and representative information the health services and other sectors can reasonably be expected to provide.

Epidemiological information systems not only play a critical role in decision-making for disease control, but are extremely important for the administration of control programmes. The information collected and analysed must therefore be in a format that allows accurate costing of the various components of the control programme.

Data are required to provide information on morbidity, mortality, drug consumption, efficacy of treatment and the quality and coverage of health service activities. Surveillance (wherever it exists) should be focused on malarial disease and particular attention should be given to complicated disease and failures of standard treatment. Programmes including or contemplating vector control should collect and use entomological data, generally by means of operational research. Programmes also need to be alert to the social and ecological (including meteorological) changes that could cause or influence malaria problems.

The need for effective information systems for control programmes is widely recognized, but their effectiveness has been hampered by a lack of timeliness or relevance of the data collected and by communication problems. Such systems should be decentralized. An alert person in the community or at the district level is often in a better position to detect an abnormality and understand its causes than people working on the basis of quantitative criteria at central level. It is therefore of great importance that personnel in the periphery, such as district medical officers, are trained to analyse epidemiological data, provided with the necessary technical resources and adequately supported by staff at central level.

In addition to supporting the periphery, the main role of central programme staff should be to analyse the broader trends and provide health service staff and those outside the health sector with the
Table 2. Characteristics of the major epidemiological types of malaria and actions required to improve malaria control

<table>
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<th>Malaria type</th>
<th>Characteristics</th>
<th>Actions required</th>
<th>Prevention</th>
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| Savanna malaria (Africa south of Sahara, Papua New Guinea) | • Perennial transmission, with seasonal variations away from equator. *Plasmodium falciparum* is overwhelmingly predominant.  
• Morbidity and mortality mainly in young children and pregnant women.  
• Expansion of drug resistance. | • Insufficient coverage by health services.  
• Malaria control programmes most often rudimentary. | • Expansion through formal and informal general health services.  
• Strengthening of capacity for management of complicated malaria and treatment failures in health services. | • Investigations on potential role of impregnated bednets and curtains.  
• Chemoprophylaxis for pregnant women, unless precluded by drug resistance. |
| Malaria of plains and valleys outside Africa (Central America, China, Indian subcontinent) | • Variable, mainly moderate transmission.  
• P. vivax may predominate.  
• Strong seasonal variation.  
• Risk of epidemics.  
• Drug resistance generally well established.  
• Large-scale insecticide spraying programmes often ineffective.  
• Inadequate disease management.  
• Insufficient general health services and private services in some areas. | • Responsibility for disease management to be assigned to general health services.  
• Establishment/strengthening of epidemiological information systems. | • Reorientation for better targeting of vector control.  
• Environmental management in some areas.  
• Use of impregnated bednets (proved useful in China). |
| Highland and desert-fringe malaria  
| (African and South-East Asian highlands, Sahel, southern Africa, South-West Pacific) | • Risk of epidemics due to climatic aberrations, changing agricultural practices or migration to malarious areas. | • Presence of health services variable. | • Facilities to be established rapidly with effective drugs in case of outbreak. | • Insecticide spraying can often rapidly curb transmission and sometimes restore malaria-free status. |
| | | • Preparedness for management of malaria cases may be poor in habitually malaria-free areas. | • Active detection and treatment of fever cases may be justified. | | |
| | | • Terrain, distances and precipitation present obstacles to malaria control. | • Health services must be aware of risk of outbreak. | | |
| Agricultural development projects  
| (Africa, Asia, South America) | • Increased transmission due to irrigation in certain circumstances. | • Insecticide resistance frequent in cotton-growing areas. | • Services for early treatment to be established/strengthened. | • Environmental management to be considered at the planning stage. |
| | | • Risk of seasonal malaria outbreaks due to attraction of non-immune labourers. | • Some financial resources are available for malaria control. | | |
| | | | | | • Appropriate siting and screening of dwellings. |
| Urban and periurban malaria  
| (Africa, South America, South Asia) | • Transmission and population immunity highly variable over short distances. | • Relatively good coverage by health services. | • Standardization or harmonization of treatment practices. | • Larval control; in some situations chemical larviciding is preferable. |
| | | • Epidemics caused by specially adapted vectors in South Asia. | • Variety of antimalarial drugs available from different sources. | | |
| | | • High human population density. | • Breeding sites identifiable. | | |
| | | | | | • Personal protection.
<table>
<thead>
<tr>
<th>Malaria type (main occurrence)</th>
<th>Characteristics</th>
<th>Actions required</th>
<th>Prevention</th>
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| Malaria of forests and forest fringes (South-East Asia, South America) | • Focally intense transmission.  
• Risk groups often occupational.  
• Severe multi-drug resistance. | • Health services absent or poorly developed.  
• Absence of social organization.  
• Variety of drugs sold.  
• Benefits of house-spraying and larval control questionable. | • Facilities must be established where needed; may need to be specialized for malaria.  
• Treatment protocols must be continually adjusted on basis of operational research. | • Personal protection.  
• Use of impregnated bednets may be considered. |
| War-zone malaria | • Displacement of parasite-carrying or non-immune populations.  
• Environmental degradation causing increased mosquito breeding. | • Disruption of vector control operations.  
• Breakdown of curative services. Distribution of drugs through humanitarian action in some circumstances. | • Drugs for treatment and advice on their use must be provided through available channels. | • Refugees and soldiers may be protected by personal protection measures and/or chemoprophylaxis.  
• Environmental measures important for refugee camps.  
• Space spraying may be applied for emergency situations in camps. |
information that will help them in their local programming. For many countries facing similar problems, continuous international exchange of information on malaria and on risk factors could play a greater role than it now does.

**Operational research**

All malaria control programmes require a capability for operational research so that programme activities can be made more effective and wastage avoided by adaptation to changing situations and biological and epidemiological factors. Such research should be relevant to national control objectives, addressing not only the efficacy of specific interventions, but also social, economic, cultural and behavioural factors that might affect programme activities and outcomes. Such factors can either increase or diminish the possibility of communities assuming greater responsibility for their own protection.

National control staff often need research training. The dissemination of research results to areas where they might be useful needs to be enhanced. National programmes and research institutes should collaborate more closely to increase the relevance of research to malaria control, to improve the quality of operational research and to ensure the application of useful research results in practice. In this connection, international communication is of great importance for exchange of ideas and for making use of results obtained in related situations.
In most countries with endemic malaria, there is a shortage of people knowledgeable in its epidemiology and in the planning and management of its control. In many, the peripheral health services are unequal to the task of diagnosis and correct treatment. An important element of the Global Strategy is therefore to build up malaria training capacity as part of the effort to equip all levels of the health services with the competence to control communicable diseases.

For malaria specifically, the object of training within the Global Strategy is to increase competence in disease management, epidemiology, the appropriate use of vector control, and the prevention and control of epidemics. This entails not only instruction in new skills for general health service and malaria service staff, but also some redirection, away from certain ingrained practices.

Other groups who need appropriate education include those who sell drugs officially or unofficially, private practitioners of traditional and modern medicine, and people in such fields as economic and development planning, agriculture and education. At the community level, for example in women’s groups and among schoolchildren, education enhances awareness and skills, empowering people to be active partners in malaria control.

Training should be task-based, problem-solving, practical and interactive. Skills to be emphasized include the ability to teach others at more basic levels, including the community. Listening and learning in the community are crucial to interactive training. Retraining is essential to reorient workers who have previously focused on eradication, and in-service training enhances skills while helping workers to adjust their activities to changing epidemiological situations.

Training itself is only one part of the capacity-building and programme-sustaining process. Another, vital part is the financing of training. The costs include not only training centres and initial courses but in-service follow-up and adequate equipment and other support so
that people can progressively apply what they have learned. In-service follow-up puts emphasis on the educative role of supervisors, which is cost-effective but not cost-free. Strong financial commitment at high level is needed to underpin training and ensure that it is sustained.

Trainers should include a national core group to conduct and coordinate training in accordance with national malaria policy, people skilled in malariology and educational methodologies, specialists such as entomologists, and people in related sectors such as agriculture, engineering and health education.

Training should take place at levels relevant to the tasks that are required, whether at international courses or in rural health centres. As a general guide, the training environment should reflect working conditions as closely as possible.

Malaria control tasks should guide curriculum content. The skills for which training is needed include epidemiology, operational research, financing, management, planning, monitoring, evaluating and replanning. Malaria programme staff must also be able to work effectively within community social structures to promote health and invite partnership.

There is a particular need to strengthen, and in many cases to restore, training on malaria in pre-service curricula for schools of medicine, nursing, pharmacy and laboratory technology. These curricula should be periodically reviewed to ensure that training is up to date in relation to norms and government policies on the management and control of malarial disease.
5

Strategy implementation

To succeed, the Global Malaria Control Strategy needs to be translated into effective national malaria control plans and programmes. In some countries, notably those in Category I, these will have to be newly established; how they are structured within the national health programme will vary from one country to another. In other countries, mainly in Category II, existing malaria control services will have to be reoriented, though resistance to change is to be expected. In both cases the aim is to strengthen the capacity of the general health services for malaria control. Linkages will have to be established outside the health sector to address the challenges posed by the broad social and economic implications of malaria. Since one of the key features of the Global Strategy is the selective application of control measures in accordance with local situations, it will be essential to prepare feasible national plans and sustainable programmes that permit careful analysis of local problems and flexibility of response to them. This process will need to be supported by appropriate government policies and regulations.

Planning

Planning of malaria control is based on an assessment of the problem and its underlying causes, the definition of objectives and an analysis of possible interventions. This allows programme priorities to be established. The immediate need is to identify populations exposed to a particular risk of disease and death from malaria and potentially epidemic situations, and to plan local and national action accordingly. Local and national guidelines are required to cover the types of action to be taken and how to adjust them as malaria situations evolve. Underlying such action is the need to plan for the progressive integration of malaria control into national health programming in such a way as to build up a country’s capabilities for long-term control.
Resource mobilization

Two main patterns of resource mobilization and management prevail, according to whether malaria control activities are integrated into the general health services or are the responsibility of a specialized unit or programme. In both cases, the resources generally originate in central government, but the priority accorded to malaria control and management differs. In either situation, a critical review of existing control activities is needed to determine their effectiveness.

As responsibilities for various aspects of malaria control are progressively shared by other partners (communities, development projects, private companies protecting their employees, municipalities undertaking environmental management, etc.), the health sector may expect some financial relief. This may, however, be offset by the extra expenditure needed to deal with the apparent increase in malaria morbidity that is often recorded in the early years of programmes based on disease management, as a consequence of better case detection and a greater flow of patients.

Specialized malaria services

Specialized malaria services are mainly found in Category II countries and consist of personnel and resources at present occupied largely with tasks that have been inherited from eradication programmes, such as house-spraying, chemical larviciding, active and passive case detection and geographical reconnaissance.

While disease management should be progressively transferred to the general health services, existing capabilities for vector control should not be sacrificed: in some situations, house-spraying remains the preventive intervention of choice. The need is for more selective use of transmission control methods, which can be based on careful analysis of epidemiological data obtained principally through the general health services. Specialized staff also have other important tasks, such as supporting the quality of laboratory diagnosis, training and assisting in the collection and consolidation of epidemiological information.

In both Category I and Category II countries, a specialist technical group should be established at central level to plan, evaluate and replan malaria control in accordance with national health policies and ensure that it fits smoothly within national health programming.
General health services

In a number of countries disease management is still partly in the hands of specialized malaria services; this situation should be progressively changed. The diagnosis and treatment of malaria should be the responsibility of the general health services.

This does not imply the abrupt transfer of decision-making, responsibilities and duties for malaria control to services untrained and ill-equipped for the task. The process should be a gradual one, local health services assuming new responsibilities for the management of malarial disease as their capabilities and resources are strengthened. The emphasis must be on planned, sustainable capacity-building; the methods used will vary according to each country's circumstances and structures.

In the particular context of Africa, activities aimed at controlling malaria, diarrhoeal diseases and acute respiratory infections share both a priority target group – young children – and major approaches. In addition, there is considerable diagnostic, and sometimes even therapeutic, overlap between the three disease states in children. Close collaboration in training, supervision and monitoring is therefore advantageous and should be promoted.

Where strengthening of laboratory-based diagnosis in the general health services is required, particularly at the district level, the resources and activities of malaria control programmes should dovetail with those of other programmes (for example those concerned with tuberculosis and sexually transmitted diseases) that have similar needs for strong general laboratory services.

Intersectoral collaboration

Often the social, economic and environmental problems posed by malaria exceed the jurisdiction and capabilities of ministries of health. Prevention and resolution of these problems require the collaboration of the health and non-health sectors. A national intersectoral coordinating group may be established to perform essential functions regarding the implementation of control activities associated with social and economic development. Legislation may also be needed to bring about intersectoral collaboration; it should deal comprehensively with this question, since malaria and other health problems are only some of the environmental hazards of concern to different sectors in evolving societies.

An assessment of the health and environmental impact of a proposed development project is demanded in many countries before
approval can be given for its implementation. This is useful in forestalling plans that could promote the spread of malaria or other diseases. Cost-effective solutions can often be found by collaboration that introduces disease-control expertise as plans are being drawn up. This helps to ensure that development activities, private or governmental, do not lead directly or indirectly to conditions injurious to health and do not create situations conducive to malaria epidemics.

Among the numerous sectors that may be concerned with malaria prevention and control within the public administration and in the private domain are those of national planning, education, housing, agriculture, energy, transport and tourism. A clear understanding of the health and economic implications of malaria is needed in these sectors at the policy-making levels that provide leadership and ensure technical coordination. No less important is the collaboration of these sectors at the operational levels of local programming and implementation, which will increase as new responsibilities for malaria control are assumed and new resources acquired at these levels.

Special mention may be made of the educational sector. The subject of malaria and its transmission lends itself to inclusion in school curricula, but this should be planned in relation to other health priorities and to the channelling of health education messages, particularly on diagnosis and treatment, through the media.

Monitoring and evaluation

Monitoring, evaluation and replanning are essential and continuing parts of the managerial procedure for malaria control. They provide evidence of the efficacy of the programme, which is required for sustaining higher-level commitment. Monitoring and evaluation of implementation activities provide a systematic way of determining whether the policies, objectives and activities are relevant to the priorities imposed by the local malaria situation and appropriate to the human and social context in which control is being conducted. By so doing, they permit replanning, as necessary, in accordance with changing situations and problems encountered.

Implementation activities should be evaluated both for their impact and for their short-term and long-term sustainability. Care is needed in selecting information on which to base indicators of epidemiological change, performance and cost-effectiveness. Objectives and targets should be reasonable and attainable and have measurable indicators, but may require adjustment according to achievements and further understanding of the malaria situation.
6

Roles of governments and international institutions

Support and partnership are needed to give effect to a global strategy based on strengthening national and local institutions so that they can define priorities and manage sustainable and effective malaria control programmes. Collaboration is imperative and should extend from the individual and the community to the national or international institutions that guide policies and help provide the means to implement them. The mobilization of adequate resources for planning, training, implementation and evaluation is crucial for success. While some countries will be able to provide those resources themselves, external assistance, financial and technical, will be required in many cases. Such support needs coordination to ensure continuity of action and unity of purpose, and to avoid duplication and wastage of resources.

Successful implementation of the Global Strategy will be accelerated where all interested parties are able to exchange and profit from each other’s experiences.

Governments

The main role of national governments is to ensure that effective and sustainable malaria control programmes are established in all areas where the population is at risk. This will require that:

- a political commitment is made to malaria control, not only by ministries of health but also by other ministries and by parts of the private sector whose activities may directly or indirectly affect the malaria situation;
- a sound legislative foundation is established for the prevention and control of malaria;
- the division of responsibilities between the general health services and any specialized malaria control services is clearly defined and
the resources available to them are used to the best effect;
• all possible intersectoral linkages are established to ensure the avoidance of malaria resulting from human activities and the use of malaria-safe practices in individual and community activities; and
• all existing or potential resources for the planning, implementation and continuous evaluation of the malaria control programme are mobilized, including those derived from private and nongovernmental organizations, and effective coordinating mechanisms are developed within countries as a responsibility of the national authorities.

Bilateral and multinational agencies

National malaria programmes will need support through both bilateral and multilateral collaborators, but such support must be well adapted to countries' priority needs, both in the interests of the countries themselves and to ensure that the assistance provided has the maximum effect. In many cases, multisectoral partners and technical agencies will find it beneficial to review their technical and funding policies for malaria control. Moreover, an appropriate administrative system should be established to ensure regular consultations and field visits by world experts. The Global Strategy offers the international community a unique opportunity to establish coordinating mechanisms to ensure an effective and sustainable input of their resources for this purpose.

Priority should be given to strengthening the capacity of health services to manage malarial disease and to preventing disease from occurring in people and communities at risk. In that connection, agencies may need to review their criteria so that support is given for policies and projects drawn up in such a way as to ensure that, as far as possible, malaria is prevented, or its risk reduced, from the outset.

Support will also be needed for collective initiatives at local, national and regional levels to promote training, to share experience and knowledge and to develop collaborative mechanisms. Furthermore, international efforts to develop new and more effective control tools in the countries concerned need to be accelerated.

The World Health Organization

WHO has a constitutional responsibility for coordinating international health work, for assisting governments in strengthening their health services and human resources, and for developing technical
standards. It fulfils this responsibility in partnership with its Member States and the international community as a whole. In the context of malaria control, WHO aims at reinforcing the capacity of countries to cope effectively with malaria as a curable and preventable disease that impedes social and economic progress.

WHO will collaborate with Member States and donors to develop an information system on national and international funding for malaria control. A mechanism will also be designed to share the experience and information of countries and supporting bodies on technical and managerial matters. Together, these should make for effective coordination and the optimal use of internal and external funds, and so facilitate resource mobilization and sustained international commitment for long-term malaria control.

WHO will continue to assist countries in strengthening their health services and in developing or reorienting national malaria control programmes. This will include promotion of technical cooperation between countries that face similar problems. In addition, a WHO Study Group scheduled to meet in 1993 to discuss the concepts and methods of malaria control will produce guidelines to assist programme managers in implementing the Global Strategy and evaluating the new approaches.¹

Regional and national programmes will be reviewed systematically, with assessment of current plans and operations and of financial and logistic constraints. An important feature of these reviews will be an evaluation of staff training needs.

With the present acute shortage of professional malaria staff and the new responsibilities of the general health services that the Global Strategy implies, there is a need for large-scale training at all levels (see section 4). WHO will assist countries in staff development, notably by supporting or organizing training workshops or seminars for the different categories of personnel. It will also assist in the essential task of improving health education and promotion.

Numerous practical guidelines and materials have recently been produced by WHO on the diagnosis and treatment of malaria, the application of insecticides, environmental management and drug procurement, as well as specifications for materials and equipment for malaria control. These will be kept up to date in response to the needs

of the Global Strategy so that the requisite standards can be maintained in all countries.

WHO plays an important part in both basic and applied research on tropical diseases, in particular through the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. In continuing collaboration with research organizations throughout the world, it will seek to ensure that research relevant to malaria control is carried out and that the results are efficiently applied.
ANNEX

World Declaration on the Control of Malaria

The Ministerial Conference on Malaria, meeting in Amsterdam this twenty-seventh day of October in the year Nineteen-hundred-and-ninety-two,

Expressing the urgent need for commitment to malaria control by all governments, all health and development workers, and the world community,

Hereby makes the following declaration:

I

The Conference recognizes that malaria constitutes a major threat to health and blocks the path to economic development for individuals, communities and nations. Almost half the world’s population is at risk from this disease, which causes over 100 million clinical cases and over one million deaths each year.

II

While over 80% of malaria cases and deaths occur in Africa, malaria is a problem in every region of the world. It affects young and old. Children are particularly at risk, malaria being one of the major killers of children in tropical Africa, taking the life of one out of 20 children before the age of five years. The disease also causes anaemia in children and pregnant women and increases their vulnerability to other diseases. It afflicts the poor and underprivileged most severely, sapping productivity and causing chronic ill health. The social and economic impact is staggering.
III

Social, political and economic changes all contribute to the worsening malaria problem, particularly through population movements and ecological disturbances. Non-immune populations entering malaria-endemic zones within the frontiers of economic development are paying an exorbitant price because they suffer disease and disability.

IV

Construction and environmental change brought about by development often create environments favourable for malaria transmission, exacerbating existing problems and opening the way for devastating epidemics in areas which were previously malaria-free, leading to many deaths and profound impoverishment of communities.

V

The spread of drug resistance is making malaria treatment more complicated, often requiring newer drugs that may be more expensive or more toxic than chloroquine. These characteristics place higher priority on personal and community action to protect people against mosquito bites and actually reduce the efficacy of malaria drug prophylaxis.

VI

Despite these problems, the situation can and must be controlled with the tools now available. We have learnt that the key to success is to apply the right strategies in the right place at the right time, and to apply the appropriate strategies on a sustained basis. In most endemic countries, the goal will be to prevent malaria mortality and to reduce morbidity and the social and economic losses provoked by this disease through the progressive improvement and strengthening of local and national capabilities. The challenge will be especially great in the least developed countries, where international solidarity will be required for sustained support.
We, recognizing the above:

• endorse the Global Malaria Control Strategy, acknowledging the need to focus upon strengthening local and national capabilities and to adapt it to specific country circumstances;

• support the four technical elements of this strategy:
  – to provide early diagnosis and prompt treatment;
  – to plan and implement selective and sustainable preventive measures, including vector control;
  – to detect early, contain or prevent epidemics; and
  – to strengthen local capacities in basic and applied research to permit and promote the regular assessment of a country’s malaria situation, in particular the ecological, social and economic determinants of the disease;

• support decentralized structures of programme management in which those closest to the problem are delegated to employ available resources most appropriately;

• accept the crucial role of a core group of national specialists in defining and evolving national strategies and in implementing effective systems of training and supervision and of health education which incorporate them. These systems are needed to assure that new knowledge, especially that derived from operational research and from routine monitoring and evaluation, is continuously made available to those in the best position to utilize it;

• know that the problem of malaria will continue to evolve, and know that malaria control strategies must, too, evolve. We support the need for continuous research and development, including basic research to develop better tools for malaria control and applied research to permit the optimal use of existing resources under the widely varying conditions in which malaria flourishes. We recognize that there is need for far more extensive support for science in the service of the social sectors, to ensure that it is put to work for all mankind.
**VIII**

We commit ourselves and our countries to control malaria, and

- will review our current efforts, acknowledging that better use of existing resources is possible, and will identify the unmet needs in order to mobilize any additional resources required to expand current activities;

- will plan for malaria control as an essential component of health development and will incorporate health development as an essential component of national development. We know that the potential for development projects to spread malaria and other tropical diseases can far exceed the ability of the health and social sectors to take remedial action. Health measures must be incorporated in such projects if they are to contribute positively to social and economic development for the communities concerned;

- will involve communities as partners in our efforts, as well as the sectors concerned with education, water resources, sanitation, agriculture and development; and

- will implement malaria control in the context of primary health care, seeing it as an opportunity to strengthen health and social infrastructures and to promote the fundamental right of all populations affected by malaria to have access to early diagnosis and appropriate treatment.

**IX**

While recognizing the primary responsibility of affected countries to take the actions essential for malaria control, we draw attention to the fact that the problem is often greatest in the very countries or areas which can least afford to take action. Recognizing also that external support will inevitably be limited in time and directed at building up self-reliance within a reasonable period, we call upon international development partners, including the United Nations system, bilateral agencies, and nongovernmental organizations to increase their support to malaria control efforts, contributing their resources so as to strengthen sustainable national malaria control plans in accordance with the global strategy and to increase support to research that will
lead to new malaria control tools, including vaccines. We base this call on grounds of social justice and equity as well as on the conviction that such support will contribute specifically to social and economic development and to alleviating world poverty.

X

We call on the World Health Organization, in fulfilment of its constitutional function as the coordinating authority on international health work, to exercise leadership in providing support for national implementation of this global strategy.

Professeur Pascal Lissouba  
Président de la République du Congo  
Président de la Conférence ministérielle sur le Paludisme

Dr Eusebio del Cid  
Minister of Health of Guatemala  
Vice-President of the Ministerial Conference on Malaria

Dr M. Adhyatma  
Minister of Health of Indonesia  
Vice-President of the Ministerial Conference on Malaria

Dr Ali Bin Mohamed Bin Moosa  
Minister of Health of Oman  
Vice-President of the Ministerial Conference on Malaria

Mrs Hilda Lini  
Minister of Health of Vanuatu  
Vice-President of the Ministerial Conference on Malaria

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