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## MALARIA CONTROL

Malaria continues to be a serious public health problem in the Region with nearly 800 000 cases reported in 1989. Rising morbidity and mortality is linked to drug-resistant *Plasmodium falciparum*. The correct management of severe or complicated malaria is critical for saving lives. Malaria is increasing among internal migrant labourers and in travellers from malarious countries entering malaria-free areas or countries where conditions remain favourable for transmission.

Control measures remain limited. Early identification and treatment at the periphery, the use of pyrethroid-treated mosquito nets, some biological control measures and wider community participation all need to be fully exploited. The areas in need of greatest attention are human resources development, health promotion and community awareness of malaria as a life-threatening disease. Operational research should aim at establishing explicit malaria control activities based on precise epidemiological conditions.

The regional meeting on malaria in February 1992 and the planned Global Malaria Summit in October 1992 will consider these issues.

## 1. THE PRESENT SITUATION

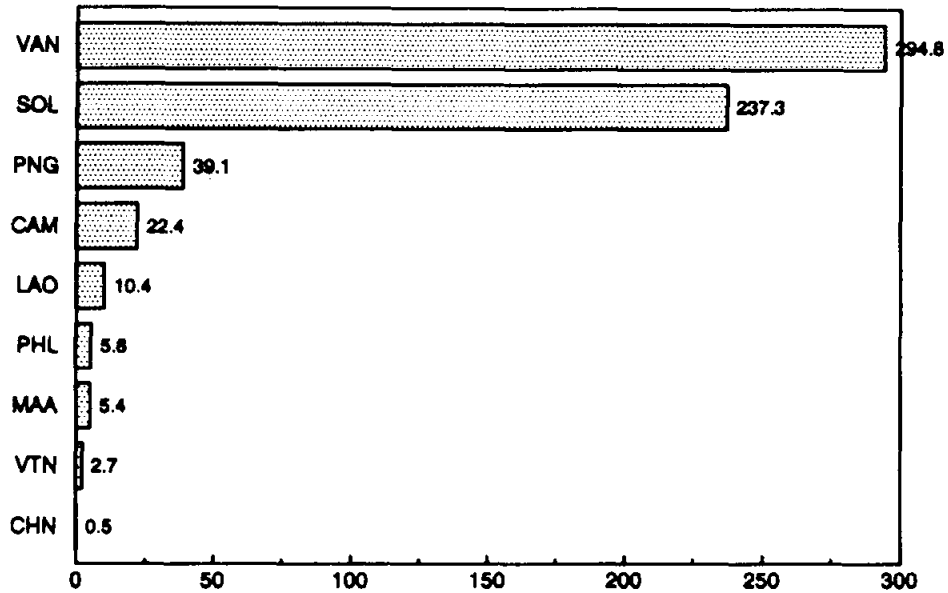
With the exception of China, the Lao People's Democratic Republic and Viet Nam all malarious countries in the Region reported increases in the number of recorded cases in 1989. The incidence is underreported in some countries and the overall figure is probably well in excess of 800 000 cases. Indeed, one country estimated as many as two million cases for 1989. In 1990 in Solomon Islands it was found that the incidence rate had more than doubled, to above 360 cases per 1000 population. A summary of the situation in the Region's malarious countries is given in Table 1 below.

**Table 1. Malaria cases in the endemic countries  
1984 to 1989  
(in Thousands)**

Country	1984	1985	1986	1987	1988	1989
Cambodia	65.0	129.2	217.4	63.1	76.7	119.1
China	904.0	563.4	363.7	211.0	134.0	88.6
Lao People's Democratic Republic	7.2	21.2	21.7	34.9	37.7	34.6
Malaysia	32.1	49.5	44.1	36.6	50.7	65.3
Papua New Guinea	150.3	182.5	140.4	165.0	83.9	121.8
Philippines	107.3	103.1	102.6	154.1	154.9	115.5
Solomon Islands	72.1	40.8	58.7	72.8	65.0	65.3
Vanuatu	28.0	24.9	22.4	26.6	26.9	37.8
Viet Nam	58.8	78.4	87.4	130.7	151.5	142.8
<b>Total</b>	<b>1424.8</b>	<b>1193.0</b>	<b>1058.4</b>	<b>894.8</b>	<b>781.3</b>	<b>790.8</b>

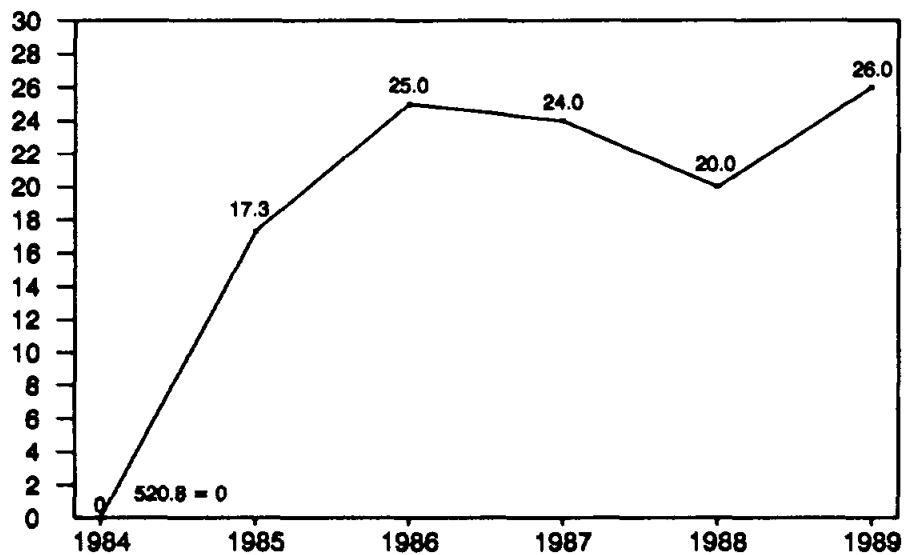
Figure 1 shows an estimate of the number of cases per thousand of population at risk by country in 1989. However, the population at risk may be overestimated, as it is difficult to establish this accurately.

**Figure 1. Annual malaria incidence of population at risk by country, 1989**



Apart from the considerable successes of the China control programme, the trend over the last six years has been one of increasing incidence, with a 26% rise in cases in the Region, as shown in Figure 2. Much of this incidence is associated with land development schemes and the exposure of migrant workers, especially in forest and mining areas.

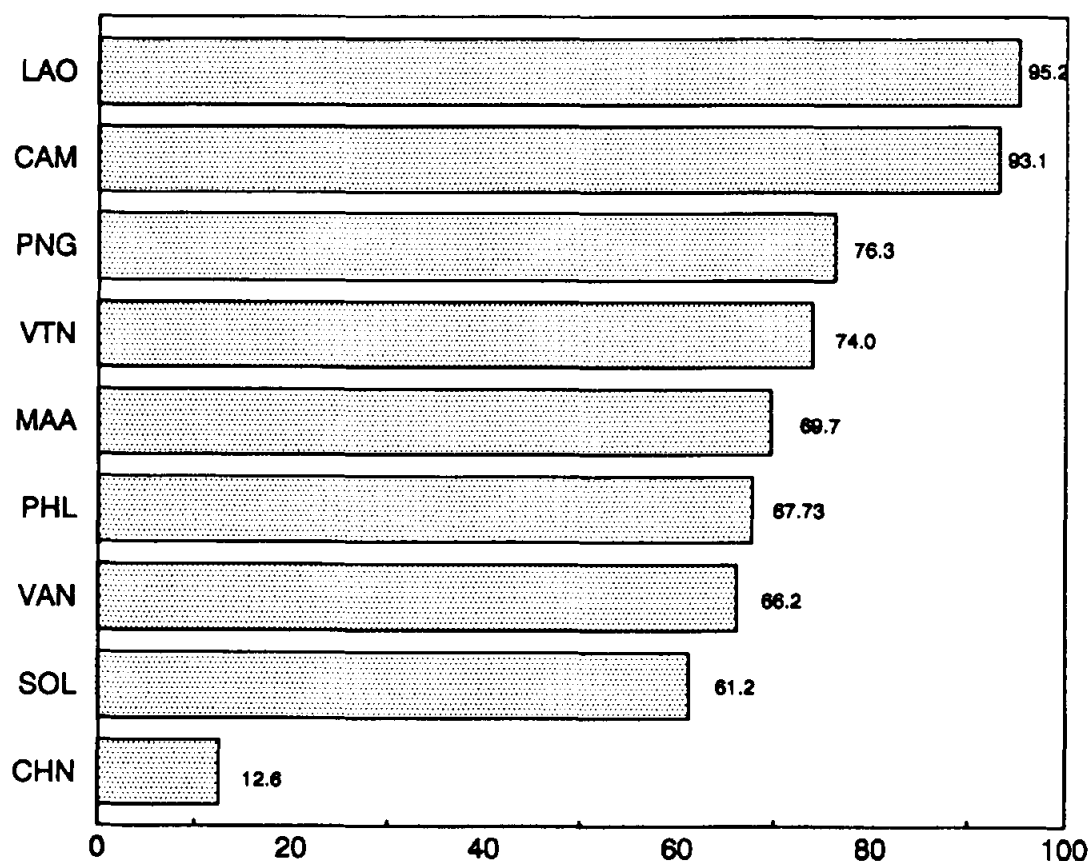
**Figure 2. Percentage increase in malaria cases in the Region 1984 to 1989, excluding China (0 = 520.8 cases)**



The potentially life-threatening species *Plasmodium falciparum* predominates in all countries except China. In two countries it causes more than 90% of the recorded cases, as shown in Figure 3. It is also responsible for the severe and complicated cases of malaria increasingly reported from Cambodia, the Lao People's Democratic Republic and Viet Nam. Many of these are due to rising levels of resistance to first, second and even third line antimalarial drugs. In Viet Nam between 1987 and 1989 there was an increase in severe or complicated cases of 77% in the north and 64% in the south (see Table 2). In Cambodia 10% of all positive cases are described as severe, and 1% of the patients die of the disease.

Although data are incomplete, the number of hospitalized cases can also be an indicator of severe malaria caused by either late reporting, poor compliance or treatment failure. Papua New Guinea recorded 15%, 30% and 23% of all malaria cases as requiring institutional admission for the period of 1987-1989. Preliminary information for 1990 indicates that the figure dropped dramatically to a little more than 10 000 admissions or 11% of the total (see Table 3).

Figure 3. Percentage of cases caused by *plasmodium falciparum* by country, 1989



**Table 2. Cases of severe and/or complicated malaria  
Viet Nam, 1979 to 1989**

	Viet Nam	Severe malaria	% Increase over 1987
1987	North	760	
	South	3 801	
	<b>Total</b>	4 561	
1988	North	916	17.0
	South	4 954	23.3
	<b>Total</b>	5 870	22.3
1989	North	3 249	76.6
	South	10 460	63.7
	<b>Total</b>	13 709	66.7

**Table 3. Hospitalized cases in Papua New Guinea, 1987 to 1989**

Year	Total number of cases hospitalized for malaria	
1987	24 663	15.0% of all malaria cases
1988	25 419	30.3% of all malaria cases
1989	27 480	22.6% of all malaria cases

Malaria mortality is of increasing concern in all endemic countries of the Region. The number of deaths due to malaria has remained stable at about 2 per 100 000 population for the Philippines and Viet Nam, 6.8 per 100 000 for Papua New Guinea, 11 for Vanuatu, and 12 for Solomon Islands. However, data from Viet Nam clearly show an increase since 1987 of about 69% in mortality attributed to malaria (see Table 4). In the Region as a whole some mortality is due to an unquantified rise in prevalence of drug-resistant malaria and difficulties in the management of severe or complicated cases. The most important reasons, however, are

inadequate self-treatment, late presentation of the seriously ill, and the inadequate diagnostic skills of some peripheral health workers. Studies carried out in Malaysia and the Lao People's Democratic Republic showed that the majority of malaria deaths occurred within two hours of admission to the hospital.

**Table 4. Mortality due to malaria  
1987 to 1989**

Country	1987	1988	1989
Cambodia	353	498	358
China	38	51	52
Lao People's Democratic Republic	505	692	463
Malaysia	75	72	62
Papua New Guinea	412	459	411
Philippines	1226	1226	1226 <sup>a/</sup>
Solomon Islands	19	31	43
Vanuatu	34	32	20
Viet Nam			
North	198	307	695
South	872	1078	2744
<b>Total Viet Nam</b>	1070	1078	3439

<sup>a/</sup>Estimated

Drug-resistant *P. falciparum* is present in all endemic countries in the Region. Resistance to chloroquine, the commonest, cheapest and safest antimalarial, is widespread. In Cambodia, Viet Nam, parts of the Lao People's Democratic Republic, Sabah State in Malaysia and parts of the southern Philippines, levels of resistance are particularly high. Multidrug resistance has now been reported from every malarious country in the Region, but so far most of the cases cited are isolated. Multidrug resistance is most common in the countries of the Indo-Chinese peninsula, but the size of the problem is not fully known. In Sabah, Malaysia, there are increasing anecdotal reports of poor response to the first-line combined drug, sulfadoxin and pyrimethamine. The number of treatment failures requiring retreatment with the first-line drug is increasing in all countries in the Region but this is frequently masked by poor patient compliance. Monitoring the drug resistance situation is both technically and operationally difficult and the true magnitude of the problem in every endemic country in the Region is not fully known. The report from Papua New Guinea of small numbers of *Plasmodium vivax* resistant to chloroquine is the first instance in the world of resistance to this drug by this species, and a reminder of the problems which can arise in malaria control programmes.

Of the countries or areas in which malaria has been eradicated in recent years, parts of Australia, Brunei Darussalam and Singapore remain receptive to the disease, with conditions favourable for transmission. In large parts of countries such as China, Malaysia and the Philippines, similar receptive areas have become malaria-free. The numbers of cases of imported malaria are therefore of increasing importance and a danger to malaria-free areas. Though necessary, maintaining epidemiological vigilance is a considerable financial drain on health services. From data available in 1989, over 2159 cases of malaria were imported into Brunei Darussalam, Hong Kong, Malaysia and Singapore from 16 countries on four continents. Six hundred of these imported cases were due to *P. falciparum* but no deaths were reported. The majority of cases were in migrant workers, refugees and tourists. Table 5 summarizes the situation.

**Table 5. Malaria imported in 1989 into four countries**

Countries	Total cases	Number of originating countries	<i>P. falciparum</i> cases
Brunei Darussalam	24	7	5
Hong Kong	741	11	5
Malaysia	1191	11	539
Singapore	203	11	57

## **2. THE TRANSITION FROM ERADICATION TO CONTROL**

The changes which have overtaken malaria control programmes in the last 15 years frequently caused problems that are difficult to solve. A transition was made from vertical short-term eradication programmes to long-term control measures, and then to control through primary health care. This has often taken place against a background of decentralization in the general health services. Such profound modifications in a short period were almost too much for many programmes to adapt to. Staff trained for eradication found it hard to know what control methods should be used and where malaria fitted in with the primary health care concept. To achieve good levels of control, it was necessary to reorient programme activities by classifying malarious areas according to specific epidemiological conditions. This work was slow to take off, partly because of the shortage of technical expertise and malaria control methods. The reduced value of DDT as an intervention measure, together with changing patterns of behaviour among primary vectors throughout the Region, made the choice of control activities doubly difficult. Poor patient compliance, apparently rising levels of drug resistance, increasing population mobility, universal financial constraints and low standards of training have all led, in the recent past, to a sense of hopelessness and low morale.

It is because of this deterioration that in January 1990 the Executive Board decided to call a "Global Summit" on malaria at ministerial level in 1992. Technical regional meetings will take place before the Summit. A joint meeting is expected to take place in March 1992 with the endemic countries of the Western Pacific, South-East Asia and Eastern Mediterranean regions participating. The deteriorating situation was also recognized in a World Health Assembly resolution (WHA43.18) in May 1990.

## **3. CURRENT APPROACHES TO MALARIA CONTROL IN THE WESTERN PACIFIC REGION**

The primary objective of control programmes now is to prevent mortality and lower morbidity to acceptable levels. It is recognized by all concerned in the Region that there is no easy solution to the malaria problem, nor is there a single strategy which can be used in all countries. The fact that a malaria vaccine will not be available for ten years or more has concentrated attention on those aspects of the problem which can be dealt with now. In recent years, health workers in endemic countries, in partnership with WHO long-term country staff, the Regional Antimalaria Team and relevant consultants, have begun to reappraise these problems. They have identified nine areas of activity that are vital to the progress of national programmes, though they may be organized in many different ways.

### **3.1 Improving early diagnosis and treatment**

Diagnosis may be based entirely on clinical appearance, or aided by microscopy. Rapid and accurate methods of diagnosis are especially important for severe and complicated malaria. The need for a more sensitive set of criteria for the clinical identification of malaria is widely recognized. A number of countries are designing, field testing and disseminating diagnostic flow charts, treatment schedules and other job aids to meet this need. Peripheral malaria clinics, or malaria treatment posts in areas of high endemicity, are urgently needed. Only clinical diagnosis may be possible in these establishments, but ideally rapid microscopic



identification and appropriate treatment based on the current drug resistance situation should be carried out. This system worked well in the past when malaria treatment posts were often the first health facility the patient came into contact with. Meanwhile, some less qualified health workers and volunteers will be able to participate in certain control activities which can be based in the clinic. Simple monitoring of drug resistance through the follow-up of treatment failures will improve treatment and provide valuable additional data to drug policy decision-making.

### **3.2 Creating a greater awareness of the seriousness of malaria**

There is an urgent need for greater awareness in the community and among health workers of the seriousness of malaria both as a life-threatening disease and as a socioeconomic problem. There is much apathy among health workers and the public and such indifference often blocks the simplest control efforts. Situations where quick, positive action, including appropriate community involvement in selected malaria control activities, have to be used. It is essential to strengthen the flow of appropriate malaria information to all segments of the community, including health workers and rural health clinics, development projects, women's groups, community leaders and schools. Methods of control which can be introduced and maintained by the family unit or the individual must be explained in clear, understandable language. Simple educational materials such as flip charts are being developed to achieve some of these objectives.

### **3.3 Promoting the use of pyrethroid-treated mosquito nets**

The demand for pyrethroid-treated mosquito nets is increasing in all countries of the Region. With 2.2 million nets distributed in China, more than 300 000 in other countries of the Region and many thousands more planned for distribution, this part of the programme is well advanced. Even in areas where the early biting behaviour of vectors would seem to preclude the use of treated nets their use is considered valuable. It provides additional protection from other insect vectors and thus improves the quality of life. In many cases Governments have to ensure the availability and distribution of nets, and the logistics of supply and retreatment can be a serious problem. It is often necessary to encourage the purchase and treatment of the nets by subsidizing the cost for members of the community who can often ill afford them. Malaria clinics will play an increasingly important part in the publicity, distribution, treatment and retreatment of nets. Training modules and videos are being developed as job aids for trainers, workers and the community.

### **3.4 Improving epidemiological data collection**

Reliable information on morbidity, serious or complicated malaria and mortality is still not available in many countries in the Region. It is necessary to improve the systematic collection of epidemiological data from the village level up. The data collected should be of sufficient quality to analyse and use to evaluate and plan malaria control activities. Some governments are testing different approaches to improving data collection and analysis. Part of this approach includes the increasingly important collection and analysis of information on drug resistance monitoring through data on treatment failures and severe and complicated malaria.

### **3.5 Improving and strengthening management and supervision**

In the recent past there has been a great loss of trained personnel from malaria control programmes. Many personnel in national programmes are comparatively inexperienced and lack good management and supervisory skills. Even in countries which have a sound

management system some problems exist. It is important to introduce modern management practices, including effective supervision and leadership. To be successful these must be adapted, where necessary, to the ethnic and political factors involved.

### **3.6 Improving national and international training capabilities**

The development of human resources remains the cornerstone of malaria control programmes. There is a critical need for drastic improvements in malaria training capabilities at the national, subregional and regional levels. This includes the development of training networks and the production of malaria information and training materials. At present, international training takes place at the Regional Centre for Research and Training in Tropical Diseases and Nutrition at the Institute for Medical Research, Kuala Lumpur, Malaysia; the malaria collaborating centre at the Australian Army Malaria Research Unit, Ingleburn, Australia; the College of Allied Health Sciences, Madang, Papua New Guinea; and the Solomon Islands Institute for Malaria Training and Research.

Much progress on the design and implementation of courses to fit recent changes has been made but more remains to be done and priorities need establishing. The WHO fellowship programme needs to be further tailored to fit national requirements. Training in malaria should be aimed at all levels, from the university undergraduate doctor right down to the peripheral health worker. Postgraduate training must be included, as it is this level which produces epidemiologists and programme managers. The curricula of nurses, health inspectors, doctors, laboratory workers and other such categories have to be modified to fit changing methods and involvement in malaria control activities. No matter how small the control programme, a training component is essential and training materials must be developed for each national activity. Extensive training of trainers is still required. Materials which are suitable for the community are also needed, based on local attitudes and ethnic backgrounds. They should be developed in collaboration with those responsible for health promotion.

### **3.7 Operational research**

In the search for more effective control measures, operational research is seen as an essential component of national control programmes. The identification of problem areas based on precise epidemiological conditions and the testing of the most effective control measures (known as "malaria paradigms") is recognized as an area of high priority and should receive greater attention in the future.

### **3.8 Development of malaria control staff**

In efforts to ensure the most effective participation of all malaria control personnel, the role of specialized staff such as the microscopist, the entomologist, parasitologist, and the epidemiologist needs to be reassessed and redefined. Where necessary job descriptions should be changed and retraining provided.

### **3.9 Integration with other disease control programmes**

Although extensively discussed, little real effort has been made to actually combine the routine activities which planners have in mind. In areas where it was attempted it enjoyed little success owing to poor lead-in planning, poor coordination and a general lack of agreement on supplies, logistics and supervisory and management issues. The activities usually proposed centre on the primary ones essential to early malaria identification and treatment, such as the part-time use of nurses or peripheral health workers as malaria microscopists. In

areas where routine microscopy involves more than one disease control programme, microscopists can be trained to be polyvalent, thus providing greater service and support.

#### 4. CONCLUSION

The great progress of malaria control programmes in the 1950s and 1960s created a false sense of security. In the following decade it was acknowledged that, owing to various setbacks, in very few places could eradication be easily achieved. Many of these setbacks were caused or associated with increasing vector resistance to insecticides, opposition to household spraying, poor patient compliance and increasingly wide dispersal of the *P. falciparum* strain which is resistant to antimalarials. This situation has continued to the present day with an amplification of *P. falciparum* drug resistance, a greater awareness among environmentalists of the consequences of using some residual insecticides, and difficulties associated with economic development in malarious areas.

The false sense of security created in the early days of the campaign also led to a slow-down in training activities. This resulted in a whole decade in which health workers had little or no training in malaria and malaria control. There is thus at present a shortage of well trained and experienced staff, especially at the middle and upper management levels. This problem is reflected in the poor management and lack of clear direction seen in some programmes.

It is now understood that there is no easy single answer to the malaria question. It is also fully recognized that each programme must base its strategy not only on financial considerations but, more importantly, on the scientific and sociological factors involved. Usually, these vary considerably, even within the same country. While standardization of procedures is essential, there is definitely room for innovation based on the results of sound operational research.

More than 145 million people live in areas where there is risk of exposure to *P. falciparum* and *P. vivax* infections. A further 360 million in China are exposed to *P. vivax*. Though it remains reasonably stable, the trend today is definitely one of increasing incidence, especially in the areas where *P. falciparum* predominates.

There is no room for complacency in this situation. Some changes must be quickly introduced to ensure stronger, better managed and more flexible programmes. Human resources development, at all levels, has to remain the cornerstone of malaria control programmes so that early identification and treatment can take place even in the most isolated community. The financial constraints which have plagued activities for the last ten years (and governments must bear some of the responsibility for this) must be tackled, and extrabudgetary resources must be tapped in the effort to save lives and reduce the suffering caused by this insidious disease.

The WHO malaria control programme will continue its efforts to work in partnership with governments in the Region to reverse the severe setbacks of recent years.