NATIONAL MALARIA CONTROL STRATEGY

MALARIA RESEARCH CENTRE

National Malaria Control Strategy

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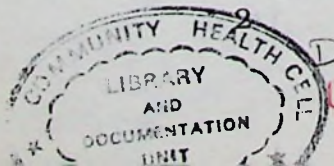

NATIONAL MALARIA CONTROL STRATEGY

EXECUTIVE SUMMARY

The National Malaria Control Strategy (NMCS) is directed to provide freedom from malaria to the people of India as their basic right. NMCS takes cognizance of prevailing malaria situation and new epidemiological paradigms in the country. These paradigms are Tribal malaria, Rural malaria, Urban malaria, Industrial malaria, and Border malaria. Malaria control under the primary health care system requires: political commitment, intersectoral coordination, legislative support, interventions based on epidemiological assessment, and flexibility in control approaches. In the background of new epidemiological paradigms, NMCS brings out the need to review: (i) drug policy, (ii) insecticide policy, (iii) re-organization of NMEP in tune with the NMCS, (iv) decentralization of malaria control , (V) epidemiological reasoning in control approaches, (vi) Community participation supported by strong IEC programme, (vii) training and Management Information System (MIS).

PREAMBLE

India is a signatory to the Global Malaria Control Strategy signed in Amsterdam in October 1992. In keeping with this international commitment, National Malaria Control Strategy (NMCS) has been drafted to supersede the modified plan of operation (MPO). The main tenet of the strategy (NMCS) is based on the commitment of freedom from malaria as the basic right of the people of India.

National Malaria Control Strategy requires:

- Political commitment;
- Intersectoral coordination;
- Legislative support;
- Epidemiological approaches in malaria control
- Community participation;
- IEC Programme;
- Management Information System (MIS); and
- Training
- Research inputs

INTRODUCTION

Historically malaria is a disease of great socioeconomic importance. The history of malaria in India is dreadful. In 1947, malaria was causing an estimated 75 million cases and 0.8 million deaths

annually. These figures often increased 2- to 3-fold or even more during epidemic years. In addition to large scale morbidity and mortality, agricultural production suffered badly in some areas like Uttar Pradesh (UP) Terai, Wynad in Kerala and Malnad in Karnataka. There were many instances where colonization was impossible due to ravages of malaria, and UP terai (distt. Nainital) is a classical example of that. Industrial development also suffered badly during those years. Starting with a moderate attempt to control malaria in Lahore (now in Pakistan) in the first half of 20th century, remarkable success was achieved through malaria eradication programme when about 1,00,000 cases were reported in 1964, and no malaria deaths. The success of the programme was so pronounced that malaria was no longer considered a problem requiring persistent efforts in its control.

PRESENT MALARIA SITUATION

There has been a considerable reduction of total malaria cases during the 1980s as reported by the NMEP. In 1976 there were 6.47 million cases which have declined to 2.1 million cases in 1992. However, *P. falciparum* cases increased from 0.75 million recorded in 1976 to 0.88 million by 1992. From 1983 till 1992, there has been stabilization of total malaria cases, although *P. falciparum* per cent is increasing steadily, i.e. 21.8% in 1981 has almost doubled to that of 43.9% in 1991. Deaths

due to malaria started in 1974, have varied between 200 and 500 a year.

The in-depth evaluation of the modified plan of operation (MPO) of the NMEP in 1985 commented on the malaria situation that "*the problem of malaria in India is grossly under-estimated*". This observation was based on several reports of underreporting by the research organizations in the country. However, malaria morbidity estimates can be made by the consumption of antimalarials as well. Yearly production of chloroquine phosphate base in the country is 270 metric tonne (mt). Assuming the use of 70 mt for other therapeutic purposes and export to the neighbouring countries, at least 200 mt is used in the country in the treatment of fevers. One metric tonne yields 4.0 million tablets of 250 mg, and therefore 800 million tablets of chloroquine are available. If we take out 300 million tablets required by the NMEP, the balance of 500 million tablets are available for the treatment of fever cases outside the NMEP. Since in the private sector 10 tablets are used to treat a case of fever/malaria, and taking into account the children and low dosage required due to combination of drugs used by the doctors, and also the poor compliance, on an average 7 tablets may be used in the treatment of one episode of malaria. Therefore, 500 million tablets would treat 71 million fever cases. Since about 50% case may be due to malaria, a rough estimate of morbidity

due to malaria comes to 35.5 million episodes in addition to malaria cases treated by the NMEP.

So far as mortality due to malaria is concerned the exact statistics of malaria deaths are not available. However, in 1989 crude death rate in the country was 10.8. Of this fever deaths were 7.3% and deaths due to malaria in fever cases were estimated to be 18%. Based on this information estimated deaths due to malaria have been calculated as 1,20,625. Vital statistics of India also reports similar deaths figures e.g., 1,37,846 deaths due to malaria in 1985 and 75,285 in 1987.

To measure the burden of disease, World Development Report 1993 uses a new measure expressed as disability adjusted life years (DALY). DALY is a measure that combines healthy life years lost because of premature mortality with those lost as a result of disability. DALY for malaria in India in 1990 was 0.47 million for women and 0.48 million for men (total DALY 0.95 million).

STRATEGY OF MALARIA CONTROL

NMEP is responsible for malaria control in the entire country except defence sector, and partially railways and municipal corporations of metropolitan cities. However, under the NMCS, responsibility for financial, technical and administrative aspects of malaria control should be shared by major establishments/institutions both in the

private and in public sectors. These institutions are the following:

- All mega projects and industrial establishments under various sectors of economy, viz. steel, petrochemicals, coal, cement, mining, fertilizers etc.
- Tea gardens/coffee plantation areas
- Irrigation projects during construction phases
- Railways/airports/seaports
- Autonomous institutions, and a few more to be identified

The main strategy of malaria control so far has been the control of malaria vectors at their resting sites by spraying residual insecticides. While this strategy would continue to be applied on selective basis, the situation of malaria has deteriorated rapidly due to creation of mosquitogenic potential under the impact of developmental activities. In such situations where malaria is generated by human activity, the primary preventive responsibility of vector control should lie with the sector(s) responsible for generating malariogenic conditions, at their own cost.

Taking into consideration the diversity and heterogeneity of malaria problem in India, existing technical, operational and administrative constraints, it is felt that at present there is no radical solution to the problem of malaria. Therefore, the major feature of the proposed National Malaria Control

Strategy is the "**Improved Management of Malaria**" with the following general objective:

- Management of serious and complicated malaria cases;
- Prevention of mortality with particular reference to high risk groups;
- Control of outbreaks/epidemics;
- Reduction of *P. falciparum* incidence, and containment of drug-resistant malaria;
- Reduction of morbidity; and
- Maintenance of low incidence status.

GENERAL APPROACHES TO MALARIA CONTROL

General approaches to the management of malaria are as follows:

(i) Organizational

- Decentralization of malaria control
- Enhanced support for the development of epidemiological approaches
- Appointment of a "link worker"[a] in tribal and difficult areas

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[a] For accelerated malaria control and early case detection and prompt treatment (EDPT) it is proposed to appoint a link worker in each village (preferably a women). Link worker would be responsible for surveillance, keep routine antimalarials, will have access to life saving drugs, help early hospitalization of serious cases, motivate people through information, education and communication (IEC) and participate in malaria control operations.

(ii) Disease management

- Early case detection and prompt treatment (EDPT) even at the most peripheral level of health services
- Disease management through improved hospital infrastructure

(iii) Transmission control

- Selective and sustainable vector control
- Rural and urban sanitation
- Intersectoral coordination
- Legislative support

(iv) Strengthening malaria control

- Prediction and early detection of epidemics
- Capability and capacity building at the periphery
- Health System Research (HSR)
- Information, education and communication (IEC) approach
- Knowledge, attitude, prejudices and believes (KAPB) approach
- Community participation
- Periodical programme reviews, e.g. drug policy; insecticide policy; drug resistance status; operational problems; inputs from research; social, political and economic determinants; and training needs etc.

PREVALENT MAJOR EPIDEMIOLOGICAL TYPES OF MALARIA

Based on existing malaria situation, the following malaria epidemiological type have been identified in the country.

Type 1. Tribal Malaria

Sub type 1.1: Tribal malaria of the deep forests and forest-fringes: Features of this malaria are stable and high malaria transmission with (i) predominance of *P. falciparum* moderately resistant to chloroquine and, focally, to sulphapyrimethamine drugs, (ii) *An. dirus*, *An. minimus* and *An. fluviatilis* as major vectors refractory to transmission control, (iii) predominant mobile tribal population and constant measurable mortality among pregnant women, children and mobile non-trib-al population groups, (iv) inadequate health infrastructure, and (v) lack of treatment facilities at the village level. Control objectives should be prevention of mortality in high risk groups and reduction in morbidity.

Sub type 1.2: Tribal malaria in proximity of forest-fringe areas and with disturbed ecology: The features of these areas are moderate to high endemicity with (i) periodic epidemics/outbreaks, (ii) predominance of *P. falciparum*, (iii) widespread low to moderate degree of resistance

to chloroquine, (iv) *An. philippinensis* (= nivipes) as main vector amenable to transmission control, (v) aboriginal tribal migrated to these areas also recently established non-tribal populations, (vi) high mortality among non-tribal and moderate among tribal population during periodic epidemics, (vii) limited health infrastructure, and (viii) lack of drugs at the village-level. Control objectives should be: (a) prevention of mortality, (b) reduction of morbidity, (c) prevention and control of epidemics, and (d) reduction of *P. falciparum* in mono- and multi-drug-resistant areas.

Type 2. Rural Malaria

Sub type 2.1: Irrigated areas of arid and semi-arid plains: The features of this malaria include (i) moderate to low endemicity, (ii) *P. vivax* predominance during lean years, and *P. falciparum* during periodic exacerbation of malaria transmission, (iii) localized *P. falciparum* resistance to chloroquine, (iv) *An. culicifacies* as the main vector, (v) multiple vector resistance, (vi) moderately developed health infrastructure, and (vii) moderate impact on health and substantial mortality during epidemics. Control objectives should be: (a) reduction of morbidity, (b) prevention and control of epidemics, (c) reduction of *P. falciparum* and (d) elimination of mono- and multi-drug resistant *P. falciparum* foci.

Sub type 2.2: Rural areas without irrigation: Important features of this malaria are: (i) low endemicity, with *P. vivax* predominance and periodic localized outbreaks, (ii) in desert areas with *An. stephensi* as major vector during interepidemic periods and *An. culicifacies* during epidemics, (iii) in other rural areas *An. culicifacies* as the major vector amenable to transmission control, and (iv) fairly well-developed health infrastructure and marginal impact of malaria on health. Control objectives should be maintenance of low incidence status and prevention and control of epidemic outbreaks.

Type 3. Urban Malaria

Sub type 3.1: Malaria in towns: Important features of malaria in towns include: (i) moderate to low endemicity, with *P. vivax* predominance and focal *P. falciparum* transmission, (ii) sporadic epidemics around construction projects, (iii) *An. stephensi* and *An. culi-cifacies* as the main vectors refractory to transmission control, (iv) limited impact on health, and (v) well developed health infrastructure.

Sub type 3.2: Malaria in peri-urban areas: This malaria is mostly influenced by *An. culicifacies*, poor sanitary conditions with low socio-economic groups living in unplanned settlements, prone to periodical epidemics. Control objectives should

be: (a) prevention of mortality and duration of illness, (b) reduction of morbidity, and (c) reduction of *P. falciparum* incidence.

Type 4. Industrial Malaria

Malaria in development projects in various epidemiological strata with: (i) disturbed ecosystems and epidemic-prone areas, (ii) one or more major vectors involved, may be amenable or refractory to transmission control, (iii) substantial impact on health of labour force, (iv) limited health facilities for prompt treatment, invariably associated with chloroquine resistance, and (v) in the north-eastern states, with mono- and multi-drug resistant *P. falciparum*. Control objectives should be: (a) prevention of mortality, (b) reduction of morbidity, and (c) suppression of transmission.

Type 5. Border Malaria

Malaria prevalent along high transmission belts, international borders and state boundaries. These areas have their own problems in regard to malaria control, e.g. frequent exchange and mixing of population, illegal activities and poor administrative control thus making malaria control problematical, and at times impractical. Control objectives should be the same as for the rest of the contiguous region, but selection

of control tools would largely be based on local situation and quality of health delivery infrastructure present.

Malaria among migrant population moving from endemic to non-endemic areas and vice-versa often presents a serious malaria problem. Migration often brings localized epidemics and new parasite strains are disseminated. Migration malaria cuts across all the boundaries of epidemiological types of malaria, but it is more pronounced in projects and intensive agriculture areas. Control objectives should be: (a) prevention of mortality, (b) prevention of epidemics, and (c) suppression of mono- and multi-drug resistant *P. falciparum*.

In the major epidemiological types of malaria discussed above, one may find overlapping areas of mixed epidemiology and therefore the above classification should be seen in a broad perspective of malaria paradigms at the national level.

MALARIA CONTROL OBJECTIVES, APPROACHES & INTERVENTIONS

There are some common features and approaches in the management of malaria which are applicable in the 8 epidemiological types of malaria described above. These are the (i) occurrence of drug resistance in *P. falciparum*, (ii) treatment

failures and use of alternate drugs, (iii) availability of life saving antimalarial drugs and related therapy at the periphery, (iv) early case detection and prompt treatment (EDPT), (v) emergency preparedness to control epidemics at the PHC level, (vi) protection to high risk groups, viz. children, pregnant women, tribals and migrants, (vii) knowledge, attitude, prejudices and beliefs (KAPB) studies in endemic areas, (viii) application of eco-friendly technologies in vector control, (ix) intersectoral coordination, community participation and IEC approaches, and (x) the use of insecticide-impregnated bednets and repellents etc.

Table 1 gives specific control objectives, approaches for disease management and transmission control for each epidemiological type.

In addition NMCS requires that:

- NMEP should be reorganized at the national, regional, zonal and state level in tune with the objectives of the National Malaria Control Strategy.
- Malaria control approaches should be based on epidemiological reasoning through a well developed management information system (MIS). MIS should be interfaced with other sectors to provide holistic account of malaria ecology in the area for planning of integrated malaria control through intersectoral coordination.

Table 1: Malaria Control objectives and approaches based on new malaria paradigms.

Epidemiological types	Control objectives	Disease management	Transmission control
1.Tribal malaria (Sub type 1.1: population 50 million)	• Prevention of mortality in high risk groups • Reduction in morbidity	• Infrastructure development • EDPT, DDC and FTDs in all villages • Establishment of link worker • Mobile van with diagnostic facility in problem areas • Referral facilities	• Selective vector control • Impregnated bednets and repellents • Ecological barrier around settlements • KAPB studies to involve communities for improved health delivery
(Sub type 1.2: population 20 million)	• Prevention of mortality • Reduction of morbidity • Prevention and control of epidemics • Reduction of *P. falciparum* in mono and multi-drug resistant areas	• Same as under Sub type 1.1	Same as under Sub type 1.1

2. Rural malaria (Sub type 2.1: population 200 million	• Reduction of morbidity • Prevention and control of epidemics • Supression of mono and multi-drug resistant *P. falciparum*	• Strengthening of existing health care services including referral • Detection and treatment of malaria cases by static health institutions and private sector • DDC and FTDs in under-served areas	• Engineering methods of vector control through intersectoral efforts • Rational use of irrigation water • Improved aronomic practices • Selective vector control
(Sub type 2.2: population 100 million)	• Maintenance of low incidence status • Prevention and control of epidemic outbreaks	• Strengthening of laboratory services at the • PHC/sub-centre level • Private sector should be activated for correct diagnosis and treatment • Case detection for early treatment	• Focal spray in areas with indigenous *P. falciparum*
3. Urban malaria (Sub type 3.1: population 75 million)	• Prevention of mortality • Reduction of morbidity • Reduction of *P. falciparum* incidence	• Malaria clinics • Involvement of Indian Medical Association • Enhancing capability of referral services	• Primary emphasis on species sanitation • Source reduction • Anti-larval measures • Implementation of

		for malaria	legislative measures • Intersectoral coordination for vector control
(Sub type 3.2: population 75 million)	• Control objectives as for type 3.1	• Activated passive case detection in slums and labour settelements. Rest as for Sub type 3.1.	• Same as for Sub type 3.1
4. Industrial malaria (population 10 million)	• Prevention of mortality • Reduction of morbidity • Suppression of transmission wherever feasible • Prevention of malariogenic potential	• Screening of itinerant labour for radical treatment • Malaria clinics on site • Strengthening of nearest hospitals • Mass drug administration whenever required	• Healthy settlements sites • Efficient water management practices to prevent mosquitogenic conditions • Anti-larval operations
5. Border malaria	• Control objectives as for the rest of the contiguous region	• Infrastructure development • EDPT, DDCs, FTDs • Referral hospitals • Alternate drugs in border areas for resistant *P. falciparum*	• Information exchange on outbreaks • Synchronization of malaria control activities • Selective vector control

- Malaria control in urban areas should practise species sanitation. There should be a common legislation to cover all urban, peri-urban and project areas in the country.
- Research on malaria should be strengthened by an element of applied, field and health systems research to be taken up by NMEP in collaboration with various research organizations in the country.
- Training programme should be decentralized, diversified to include non-health sectors and strengthened by setting up institutions at the national and state level.

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