

# Situation Analysis of Malaria Control in Five Selected Pilot Areas in the Country for the Implementation of Roll Back Malaria Initiative

Roll Back Malaria (RBM) is a new global initiative against malaria. RBM has been built on the foundations of the accelerated implementation of malaria control in the African region, which was based on the regional and global strategies for malaria control. Its objective was to halve the malaria burden in participating countries within a decade through interventions that are adapted for local needs and by reinforcement of the health sector. The principal mechanism for achieving this is through intensified national action by country-level partnerships working towards common goals within the context of health sector development and using agreed strategies and procedures. As a first step in this endeavor, WHO-SEARO has assigned the task of carrying out situation analysis of malaria control to National Institute of Malaria Research for the implementation of RBM Initiative in India. Five pilot areas were selected for situational analysis. These were Goa state, District Jodhpur (Rajasthan), District Tumkur (Karnataka), District Keonjhar (Orissa) and District Aizawl (Mizoram). The main objective of the study was to provide necessary inputs for the preparation of action plan for implementing the roll back malaria initiative (RBMI).

The objectives were:

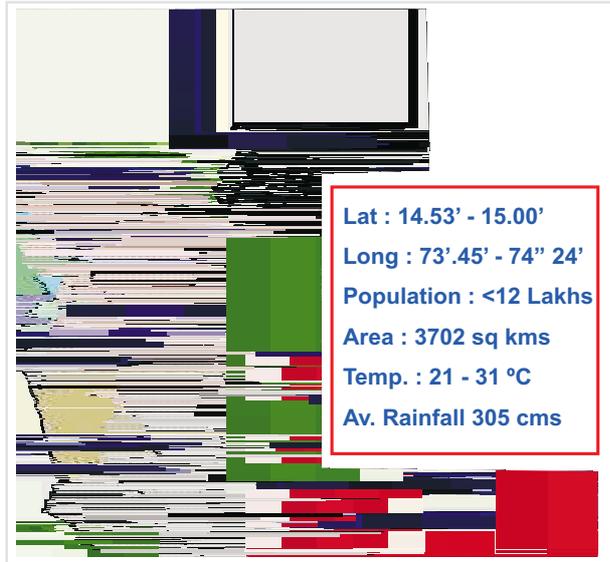
- (i) to assess the strengths and limitations of the health infrastructure for supporting disease control activities at the state, district and at other administrative levels within the district and of the private and public health care delivery systems for malaria control;
- (ii) to identify priority needs of the community for health care delivery with reference to malaria;
- (iii) to collect evidence-based data of malaria with special reference to case detection and treatment, disease prevalence, drug sensitivity of *P. falciparum*, prevalence of vector species and their abundance, host preferences, breeding habitats and insecticide resistance status of vector species; and
- (iv) to identify potential partners and opportunities for more effective intervention, prevention and treatment of malaria especially at the community level.

A common methodology was drawn for carrying out the task in two phases. Initially, in September/October 2000, an elaborate exercise was made to assess the situation of malaria control in the proposed sites to identify the constraints both technical and administrative, and possible suggestions for the preparation of effective implementation of RBMI. Later, during September/October 2001, surveys were carried out to generate data on various key issues of direct relevance for malaria control and needs for addressing the same in the light of the situational analysis made earlier. The situation analysis also included conducting of workshops at community and district level to inform the concerned partners about the objectives of roll back malaria initiative and the role they could play to achieve the effective malaria control. Data from these evidence-based surveys were analysed and final reports were prepared. Finally, a workshop was conducted in each district in which the officials from all sectors participated. The results of situation analysis were presented and final report was handed over to the District and State Health Officials.

Following is the summary report of each selected area:

## Goa State

The Goa state on the western coast of India was selected for the implementation of RBMI. This state is administratively divided into two districts (north Goa and south Goa) and 11 talukas, but for malaria control operations the state is considered as one district (Fig. 122). The district has five community health centres (CHCs), 24 primary health centres (PHCs), four urban health centres (UHCs), 27 rural medical dispensaries (RMDs), one urban medical dispensary (UMD), one Ayurvedic dispensary, two Homoeopathic dispensaries, four National Filaria Control Programme (NFCP) units, 172 sub-centres, 369 villages and 32 malaria clinics, 16 government hospitals and 92 private hospitals with a good net work of private practitioners. There are no drug distribution centres (DDCs) while sub-centres function as fever treatment depots (FTDs). Until 1985, malaria was not a serious problem in Goa. First



**Fig. 122: Map showing location of core malarious UHCs and PHCs of Goa state**

outbreak of malaria occurred in 1986 followed by many till 1990s. The outbreaks were around the building construction sites. There was also increased prevalence of *P. falciparum* and deaths were also reported during the years 1996 to 2000.

The major vector responsible for the transmission of malaria is *An. stephensi* and was found profusely breeding in the curing tanks at the construction sites (Fig. 123). *An. culicifacies* was also found in low densities. Though malaria in Goa state is restricted to urban area, urban malaria scheme (UMS) has not yet been established. Transmission was also high among

the labour population living in the precincts of the construction sites. The major vector control measure is larviciding of the breeding sites and limited use of larvivorous fishes. Indoor residual spraying against adult mosquitoes is not being undertaken in rural areas due to very low API. *An. stephensi* larvae were susceptible to the two chemical larvicidal insecticides used for antilarval measures, fenthion and temephos. The National Filaria Control Programme units are responsible for vector control but are without requisite technical man power. Municipal bye-laws for implementing legislative measures exist but are not exercised effectively. Focal sprays against adult mosquitoes are undertaken on detection of cases. Adult *An. stephensi* was resistant to DDT but was susceptible to synthetic pyrethroids.

From the results of the studies carried out by RBM team, some constraints were identified that need immediate attention for effective implementation of malaria control. The posts of District Malaria Officers were vacant in both the administrative districts. There were vacancies of other supporting staff as well. To augment the work force for better malaria control, these posts may be filled. Non-existence of sufficient supporting staff is leading to under reporting of cases. Required political support is to be generated to implement legislative measures. Drug susceptibility tests are to be conducted to assess the magnitude of drug failure. Geographical reconnaissance of the breeding habitats in urban areas with special reference to construction sites is to be made to carry out the antilarval measures effectively. Inter-sectoral coordination and



**Fig. 123: Curing tanks at construction site in Ward No. 1 and 12 supporting the breeding of *An. stephensi* during the evidence-based situation analysis survey in Panaji, Goa**

Information, education and communication (IEC) activities in the community will be of immense help for implementing the initiative. The Government of Goa has in principle accepted to integrate RBMI as a strategy for malaria control into the existing health infrastructure.

### District Jodhpur (Rajasthan)

District Jodhpur in the western region of Rajasthan state spread over an area of 22,850 sq km is an arid district. Administratively the district is divided into three sub-divisions, Jodhpur, Pipar City and Phalodi. The health infrastructure has 16 government hospitals, 39 private hospitals, 10 CHCs, 73 PHCs, 512 subcentres and 480 DDCs and 55 malaria clinics. The general health infrastructure is elaborate but ~ 20% key posts of relevance to malaria control are vacant. These posts include Biologists (UMS), Assistant Malaria Officers, laboratory technicians and multipurpose workers.

The slide positivity rate (SPR) and annual parasite incidence (API) of malaria in the district during four years (1997–2000) was >1 with proportion of *P. falciparum* (*Pf* %) in the range of 5–14%. Based on the criterion of the range of API of three years (1997–99), 73 sub-centres (46, API in the range of 2–5; 16 in 5–10 and 11 in API >10) and on the criterion of *Pf*% of >30, 42 sub-centres were identified for high risk of malaria. For treatment of malaria cases National Vector Borne Disease Control Programme (NVBDCP) drug policy is followed. The parasite is susceptible to the first line of drug, chloroquine. Microscopic diagnosis of cases is only done at CHCs and facilities are to be provided at PHCs to avoid delays in administering radical treatment. FTDs are non-existent and the same are to be established at least in the identified high risk areas. Voluntary link workers are to be appointed in high risk areas.

*Anopheles stephensi* is the main vector responsible for the transmission of the bulk of malaria. In some areas with granite mining, *An. culicifacies* species A was found responsible for transmission of malaria. *An. stephensi* was found to breed and rest preferably in the underground water storage tanks (Tankas) (Fig. 124). Most appropriate strategy for the control of this species would be mosquito-proofing of “Tankas” and this would curtail most of the mosquito breeding. The major vector control measures undertaken in the district are two rounds of IRS of DDT, chemical larvicides, use of larvivorous fishes and limited use of bio-pesticide in breeding places. These measures are more appropriate for the control of malaria in areas where *An. culicifacies* was responsible for the transmission.

Strategies to control *An. stephensi* breeding are to be implemented to control bulk of malaria in the area. The magnitude of malaria is small and is in limited areas and can be controlled with some concerted efforts in the affected areas. Health education camps for sensitising the public and



Water storage tank

Pitcher



Stone quarry



Cement tanks

Fig. 124: Mosquito breeding sites in District Jodhpur

advocacy workshops for private practitioners to follow NAMP drug policy and for improvement of inter-sectoral coordination (both governmental and non-governmental) will be of help to control malaria effectively.

### District Tumkur (Karnataka)

This district is situated in Karnataka state. The district has 10 administrative units (Talukas). The health infrastructure in the district comprises of 93 PHCs, 38 PHUs, two general hospitals (400 bed and 100 bed), seven taluka hospitals (50 bed each), 28 Ayurvedic hospitals, 376 sub-centres, 646 DDCs and 4 FTDs.

Malaria in the district is mainly a rural problem. On an average 15,000 malaria cases are reported annually with >25% of *P. falciparum* cases. The main vector of malaria is *An. culicifacies*. *Anopheles fluviatilis* occur in low densities in some months of the year and based on the prevalence of sibling species, this species was not considered as a vector species in this district. The anti vector measures are



**RBM Workshop at Jodhpur**

insecticide-based IRS against adult vectors in rural areas and antilarval measures in urban areas. DDT, malathion and synthetic pyrethroids are used for IRS and fenthion and temephos for antilarval treatments.

Analysis of the epidemiological data for the years 1999–2000, revealed that besides a few talukas in District Tumkur a few congruent talukas in Districts Chitradurga, Hassan and Chikmagalur were responsible for 25% of the total cases of malaria and 85% of the total *P. falciparum* cases in Karnataka state (Fig. 125). If major attention is paid for the containment of disease in the regions identified in the above districts most of the *P. falciparum* malaria in the entire state can be controlled. Other administrative and technical constraints were identified during the situation analysis for necessary remedial measures. Generally, it was found that there are vacant posts and lack of training for the technical staff for collection and correct identification of parasites in blood smears. Delay in administering of radical



**Fig. 125: Map showing high risk PHCs Chiknayakanhalli, Arsikere, Hosdurga and Kadur of four districts—Tumkur, Hassan, Chitradurga and Chikmagalur**

treatment to confirmed malaria positive cases was noticed. Good working microscopes, convenient packages of medicine (Blister pack of doses of chloroquine and primaquine may be provided), establishment of DDCs and FTDs would help to control malaria effectively.

Entomological unit of the state in collaboration with NIMR may stratify the areas based on vector species prevalence and some important indicators to understand the transmission dynamics of malaria in the area with special emphasis on the susceptibility status to insecticides in use in public health spray. It has also been emphasised to provide sufficient logistic support and staff for effective implementation of malaria control activities. A good resource of active NGOs and a network of research institutions are available in health sector and can be involved for implementing the strategy. Traditional cultural troupes exist in rural areas and can be utilised for educating the mass community.

### **District Keonjhar (Orissa)**

The Orissa state is endemic for malaria and this state alone contributes over a third of all *P. falciparum* cases and half the deaths due to malaria in India. District Keonjhar is one of the highly malarious districts in the state with >90% prevalence of *P. falciparum* cases. The district health infrastructure comprises of a district headquarter hospital, two sub-divisional hospitals, eight government hospitals, nine CHCs, 13 PHCs, 30 Ayurvedic dispensaries, 48 Homoeopathic dispensaries, 316 sub-centres, 2508 DDCs and 384 FTDs. All the 13 PHCs of the district are at high risk of malaria. The API in the PHCs range from 5 to 124. Two malaria vectors, *An. culicifacies* and *An. fluviatilis* are prevalent in the district. Transmission of malaria is perennial. For vector control, IRS of DDT is being done. In insecticide susceptibility tests, *An. culicifacies* was found resistant to DDT while *An. fluviatilis* was susceptible to DDT and also to malathion and deltamethrin. Based on physiogeographic, sociocultural attributes and vector prevalence, the district was divided into two strata (Fig. 126). Stratum-1 comprises hilly and forested areas of the district inhabited predominantly by tribal population and *An. fluviatilis* is the main vector species which rests indoors and is responsible for transmission of major part of malaria. The API of this stratum ranges from 42 to 120.

Stratum-2 is more or less a plain area inhabited predominantly by non-tribal population with extensive paddy cultivation with irrigation dams and canals. The vector responsible for transmission of malaria is *An. culicifacies* and is resistant to DDT and susceptible to other insecticides. The API in this stratum is in the range of 2.7 to 50. It may be noted that most of the cases of malaria are contributed by stratum-2. A regular spray with DDT following the schedule and good coverage will result in good control of disease. As the parasite is still susceptible to the first line of

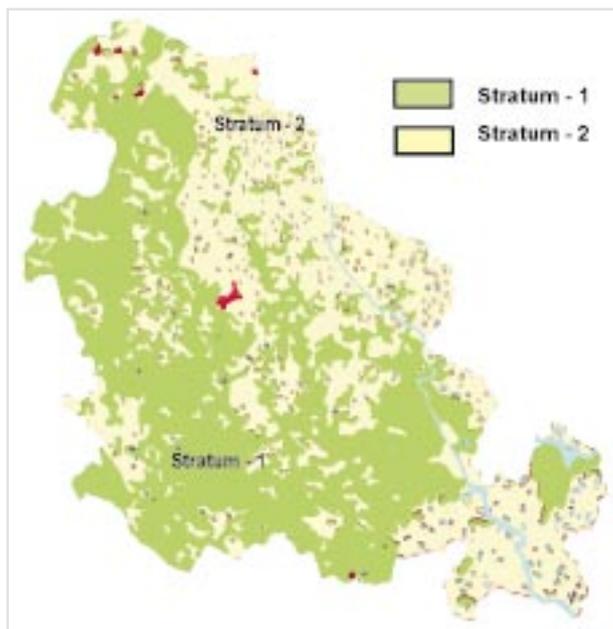


Fig. 126: District Keonjhar showing forested (Green) and non-forested (Yellow) areas as Stratum-1 and Stratum-2

treatment, chloroquine if the cases are treated promptly the disease in this district can be controlled. The district has sufficient health infrastructure and if utilised properly the desired control can be achieved. The major constraint for control in the district is remoteness of the villages in the forested areas which delays the reporting and treatment of cases and inadequate supply of insecticides. Some of the indicators which are of direct relevance to the control operation and need immediate attention are information on resistance monitoring of insecticides in the vectors and drug-resistance status in parasites. Other factors that need attention are efforts for inter-sectoral collaboration, health education to community, motivate people to visit government dispensaries for treatment and analysis of the available data for planning control operations.

### District Aizawl West (Mizoram)

District Aizawl west of the Mizoram state was selected for the studies. The health infrastructure of the district comprises of two government hospitals, two CHCs, 21 PHCs, 98 sub-centres and 22 DDCs. The general health infrastructure was satisfactory. However, it was noted that the two key posts for malaria control, District Malaria Officer and Assistant Malaria Officer were vacant and the entomology unit was non-functional.

This district is endemic for malaria with API in the range of 1 to 90 in 1999. During the years 1996–2000, the proportion of *P. falciparum* cases was in the range of 72–79%. There are reports of drug-resistant *P. falciparum* (RI–RIII) from different parts of the state. The treatment of confirmed malaria cases is as per the NAMP drug policy but use of quinine (intravenous) and artesunate was prevalent.

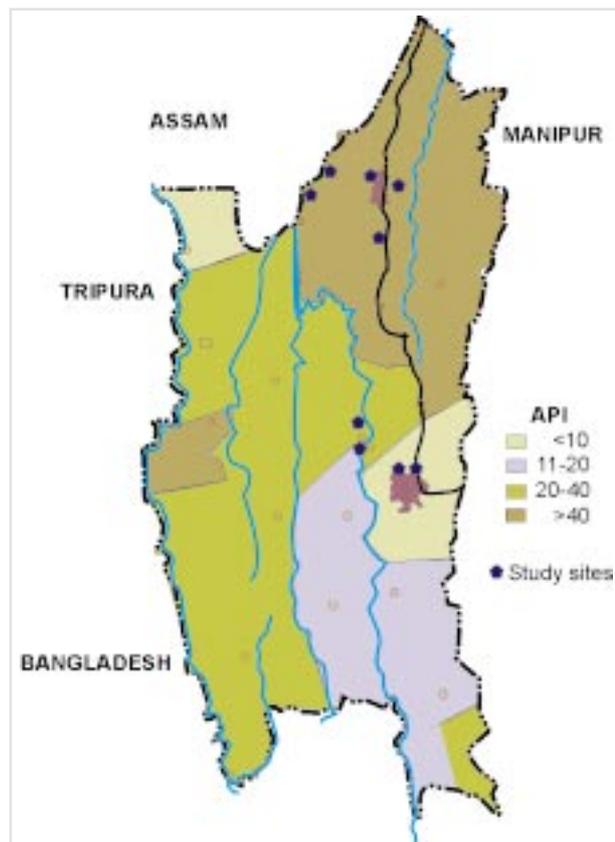


Fig. 127: Map showing API from 1995 to 99 in the study areas

The major vectors of malaria in the region are *An. dirus* and *An. minimus*. Vector control is mainly by two rounds of IRS of DDT. The coverage of the spray was usually >90%. In addition to IRS, insecticide-treated mosquito nets (ITNs) were being distributed since 1996. In the year 1999, one lakh deltamethrin-impregnated nets were distributed and in 2001, 1.5 lakh nets were distributed. During the present entomological surveys very low densities of vector species were observed contrary to the earlier reports of high prevalence. This decreased density in vector species could be due to the extensive use of ITNs resulting in mass-effect on the mosquito population.

Based on the API data of the years 1995–99 the district was stratified into four strata (Fig. 127). The northeastern part of the district was highly malarious with API >40 while the western part had API in the range of 20–40. In southeastern part API was in the range of 11–20. The central part around Aizawl City is least malarious. It was generally observed that over the years the endemicity of malaria in the district is decreasing. To sustain this, key posts be filled up, distribution and use of ITNs in the community be encouraged further, active involvement of result-oriented NGOs present in the region and impart health education to the community will be advantageous for the programme. Health society involving Governmental, military and paramilitary personnel, NGOs and elected leaders be formed.

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