

## Malaria Epidemic Investigations

A number of malaria outbreaks have occurred in the country. The Centre carried out investigations of epidemics either at the request of NAMP/ State Govt./ICMR or on its own to find out the causes/factors responsible for the epidemic.

During 1981-82 investigations were carried out in Kharkhoda PHC of Sonapat district (Haryana) and Kichha PHC of Nainital district (U.P.) to assess the malaria incidence (Sharma *et al.*, 1983). In Gadarpur PHC of Nainital resurgence of malaria was investigated in 1983 and slide positivity rate (SPR) was 67.5 and slide falciparum rate (SfR) 71.5%. *An. culicifacies* and *An. fluviatilis* mosquitoes were incriminated as vectors of malaria (Chaudhary *et al.*, 1983). In villages of Nigohi and Tilhar PHCs of Shahjahanpur

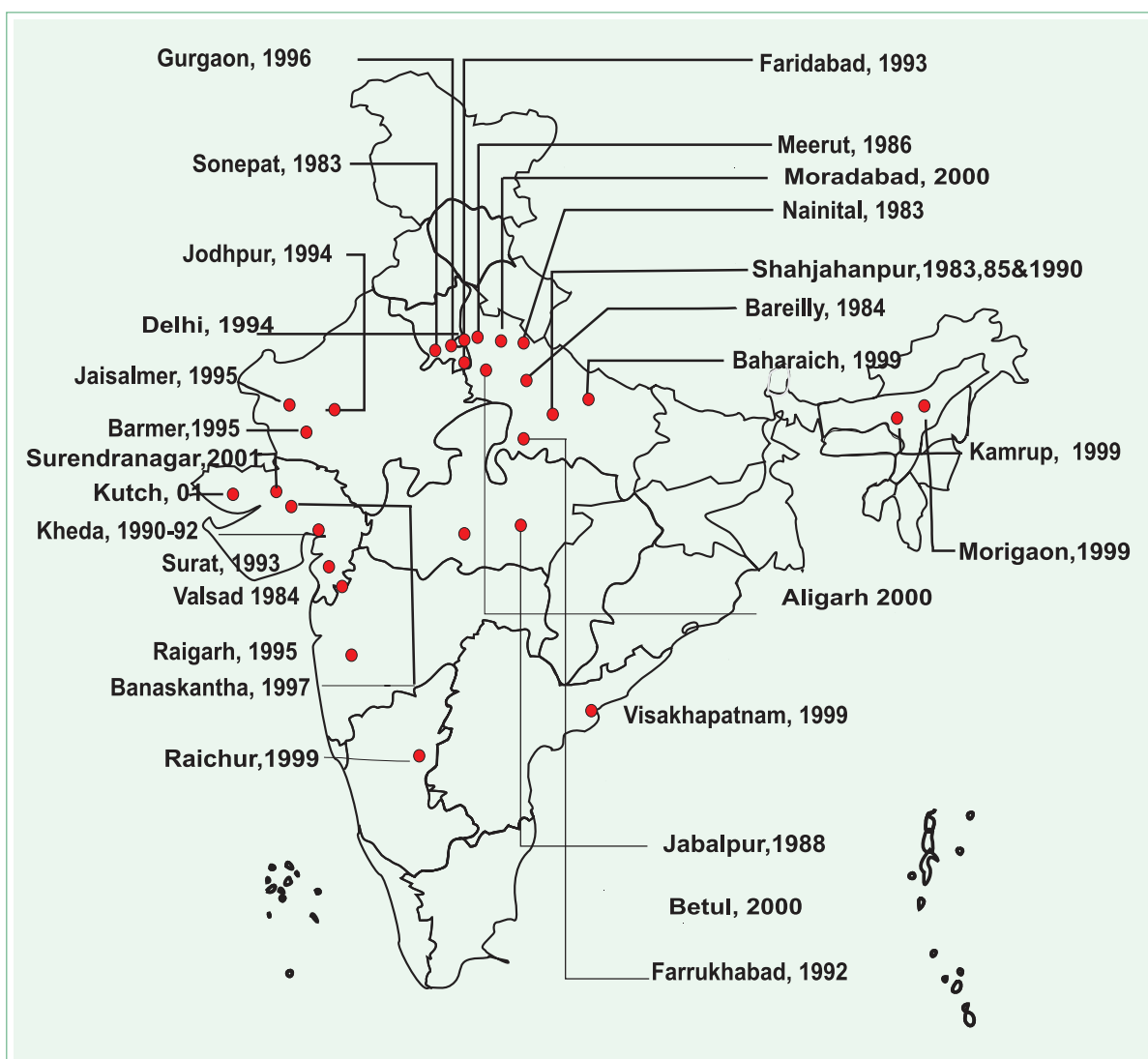


Fig. 1: Malaria epidemic investigations by Malaria Research Centre

district, U.P. (Chandahas and Sharma, 1983) in spite of 3 rounds of HCH spray and intensive efforts to control malaria, SPR was found as 75.3 and Sfr as 95.1%. HCH was not effective against malaria vectors due to development of resistance. Remedial measures were suggested to the state government. Follow-up studies as well as subsequent epidemics of malaria in Banda PHC (Shahjahanpur) and Banyani PHC of Farrukhabad and Bareilly (U.P.) were also investigated (Ansari *et al.*, 1984; Sharma *et al.*, 1985; Prasad *et al.*, 1992 & Prasad and Sharma, 1990). In 1986 in villages of Meerut district (U.P.), it was found that about half of the patients were asymptomatic and HCH was found ineffective (Ansari *et al.*, 1986), and malathion for indoor residual spray was recommended.

Investigations were carried out in Madhya Pradesh (Singh *et al.*, 1988), Gujarat (Sharma and Gautam, 1990; Srivastava *et al.*, 1995 & Srivastava and Yadav, 2000), Haryana (Sharma, 1993 & Raghavendra *et al.*, 1997), Rajasthan (Shukla *et al.*, 1995 & Batra *et al.*, 1999) and Delhi (Adak *et al.*, 1994 & Sharma *et al.*, 1985). The locations of all study sites with years of investigations are shown in Fig. 1. Details of latest epidemic investigations carried out during 1999 to 2001 in Visakhapatnam (A.P.) (Dhiman *et al.*, 2001), Baharaich (U.P.) (Dhiman *et al.*, 2001), Morigaon and Golaghat (Assam), Raichur (Karnataka), Dadri, Aligarh and Moradabad (U.P.), Betul (Chhattisgarh), Surendranagar and Kutch (Gujarat) are given in Table 1.

**Table 1. Malaria epidemic investigations carried out during 1999–2000**

Place and month of investigation	Findings *Recommendations
Morigaon, Golaghat (Kamrup, Assam) May 1999	Lack of surveillance. *Use of ITMN and IEC activities suggested.
Paderu (Visakhapatnam, A.P.) July 1999	Lack of surveillance owing to difficult terrain, onset of early rains, detection of resistance in <i>An. culicifacies</i> to DDT, detection of resistance to chloroquine in <i>P. falciparum</i> . *Use of malathion/synthetic pyrethroids for residual spray, treatment schedule for drug resistant subjects as per NAMP policy and to explore the possibility of using ITMN.
Jarwal (Baharaich, U.P.) Sep–Oct 1999	Shifting of surveillance workers resulted in low API (< 2) hence, there was no spray and resistance in <i>P. falciparum</i> parasite to chloroquine. *Training of technicians, use of suitable drug for resistant cases as per NAMP policy and strengthening of surveillance also in other PHCs of the district.
Raichur (Karnataka) Nov 1999	High SPR 71.2% with <i>Pf</i> 95.1%, <i>An. culicifacies</i> resistant to DDT, <i>P. falciparum</i> parasite resistant to chloroquine. *Bioenvironmental control through larvivorous fishes.
Moradabad (U.P.) (Sep–Oct 2000)	SPR 84.7; <i>Pf</i> 97%; <i>An. culicifacies</i> was resistant to DDT and susceptible to malathion and deltamethrin. *Deployment of health workers and strengthening of surveillance system were recommended.
Dadri CHC, Gautam Budhnagar (U.P.) Sep 2000	Mean SPR 44.6% (highest 52.1%); <i>Pf</i> % 87.6. <i>An. culicifacies</i> was found resistant to DDT (21.5% mortality). Insecticide spray was not done in last 10 years.

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Place and month of investigation	Findings *Recommendations
Betul (Chhattisgarh) Oct–Dec 2000	<p>*Strengthening of surveillance system, change of insecticide for indoor residual spray.</p> <p>35 affected villages of three PHCs were surveyed, SPR, SfR and <i>Pf</i> were 52.5, 50 and 93.3% respectively.</p> <p>*Synthetic pyrethroid/malathion to be sprayed in all the PHCs. Mobile health clinic/camp to be organized on a priority basis. All <i>P. falciparum</i> cases are to be treated with Fansidar (SP combination). People to be encouraged to use personal protective measures, i.e. bednets, skin repellents etc. In remote villages rapid diagnostic tests, such as OptiMAL/ICT are to be used. Pregnant women and infants are to be given chemoprophylaxis, and health education to be given top priority, and release of larvivorous fish in all breeding places.</p> <p>These recommendations were implemented by Govt. of M.P. as a result there was over 60 and 70% reduction in malaria cases and in falciparum cases respectively in 2002. Besides, spleen rate in children declined from 72% in 2000 to 25% in 2002.</p>
Chandausi and Iglas PHCs, Aligarh (U.P.) Nov 2000	<p>SPR 41–73.6%; <i>Pf</i> % 94.7–100; and IRS was not done in last 10 years.</p> <p>*Strengthening of surveillance and indoor residual spray to be done regularly.</p>
Surendranagar (Gujarat) 2001	<p>Some villages were affected by the earthquake, poor surveillance, high rainfall leading to high densities of <i>An. culicifacies</i>, poor coverage of malathion spraying in some villages, high breeding of anophelines in domestic waters, susceptibility of <i>An. culicifacies</i> to malathion was 100%. Mopping up round of malathion sprayed in villages with poor spray coverage.</p> <p>*Since it is dry zone, use of fish in permanent waters and peridomestic breeding can be controlled in most months of the year, improvement in EDPT, training of PHC Medical Officers, detailed epidemiological study in Patadi taluka.</p>
Kutch (Gujarat), 2001	<p>Increased vulnerability after earthquake due to breakdown of health services, excess rainfall, migrant labourers for reconstruction brought parasite load.</p> <p>*Strengthening of active and passive surveillance including role of mobile dispensaries, fogging in outbreak affected villages, use of fish in permanent water bodies and check dams, use of rapid diagnostic kits, training of MO's, laboratory technicians, screening of labour population.</p>

\*The recommendations/suggestions are sent to concerned state government and NAMP for necessary action.