

# ANTIMALARIA ACTIVITIES IN NEPAL

by

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## 1. Introduction

Among all the tropical disease, malaria in its various forms, has long been the chief cause of mortality in Nepal through the ages, the vast forests of terai, stretching like a blanket between India and Nepal, have long been known to harbour virulent forms of malaria, often rapidly fatal to the unwary travellers. In the past, this fact had contributed to the isolation of Nepal from the rest of the world and thus had played a role in the delay in socio-economic development, which was a feature prior to 1951.

## 2. Malariometric Surveys

In order to study the distribution and intensity of malaria, malariometric surveys were conducted by the Insect-borne Diseases Central Bureau (IBDC), a joint venture of His Majesty's Government of Nepal (H. M. G.) and US/AID (formerly United States Operation Mission) in selected districts of the whole country.

The results are summarized below ;

### Insect Borne Diseases Central Bureau (IBDC) Surveys

No. of di tricts surveyed	No. of village surveyed	No. of slides taken	No of villages and range of positivity rates					
			0%	1-10%	11-25%	26-50%	51-75%	76-100%
11	124	5037	21	20	17	26	28	12

The results indicated that malaria was generally hypo-endemic in the hill valleys and in the cultivated plains of the terai while it was hyper-endemic in the forest belts of the terai and the inner terai.

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### 3. Malaria Control

During 1956--1958, H. M. G undertook to carry out a malaria control project in the Rapti valley, with the collaboration of WHO, to carry out malariometric studies to determine the original endemicity of malaria and the best methods to control it. The Pre-spray results of the Rapti valley project are summarized below:

#### a) Pre-Spray data

i) Number of children examined (2-9 yrs)	Spleen rate	Average size of enlarged Spleen
797	92%	2.0
ii) Number of children examinee (2--9 Yrs)	Child Parasite Rate	Infant Parasite Rate
724	69%	62%.

The entomological surveys in Rapti valley showed the presence of 21 anopheline species, of which *A. minimus* was incriminated as the vector of malaria. It was apparent that transmission was so high that infection was occurring almost immediately after birth, in many instances.

After the preliminary surveys, domiciliary DDT spraying was carried out and results of post-spray surveys carried out to determine the effects of spraying are given below:

Year	Child parasite rate	Infant Parasite rate
1959--60	37.6%	13.1%
1960--61	0	0.41%

### 4. Delimitation and Epidemiology of Malaria

4.1 The IBDC operations and the WHO assisted malaria project in Rapti valley demonstrated the success of the antimalaria measures undertaken and the methods adopted. These campaigns paved the way for a country-wide malaria eradication project (MEP), which was to be achieved in stages.

4.2 The surveys carried out since 1956 have revealed that malaria is prevalent throughout the terai, inner terai and in some pockets of the hill valleys. Due to various considerations, it was decided to limit the MEP activities to an altitude of 4000 M. S. L. It was proposed to do additional studies to determine the extent of malaria in higher altitudes.

### 5. Malaria Eradication

5.1 The two main principles of malaria eradication programme are interruption of transmission and elimination of reservoir of infection.

5.2 The MEP comprises of four phases of activity.

The first is the Preparatory phase to organise and establish the programme.

The second is the Attack phase during which all human and animal dwellings are given residual spraying with the insecticide DDT, on a total and complete coverage basis. Simultaneously, domiciliary fever surveys on a fortnightly or monthly basis, to detect parasite positive malaria cases and to radically treat them besides investigating the foci, are carried out.

The third is the Consolidation phase in which DDT spraying is withdrawn, on the incidence of interruption of transmission, but surveillance continues to be maintained to detect residual and imported cases and to take necessary remedial actions as warranted.

The fourth phase is the Maintenance phase in which the achieved eradication of malaria is maintained by the general health services.

5.3 The summary results of the parasitological surveys done during the preparatory phase are as follows:

	North Central	South Central	East Zone	West Zone
Hyperendemic IPR +	29.0—34.6%	9.4—34.4%	20.5—41.6%	11.0—85.1%
Areas CPR ×	23.2—40.0%	21.18—50.7%	20.9—50.1%	11.7—70.4%
Hypoendemic IPR	0.0—0.8%	0.5—1.1%	0.2—3.9%	0.0—4.6%
Areas CPR	0.7—2.2%	0.5—1.0%	0.2—4.3%	1.3—7.8%

In the hyperendemic area, the predominant malaria parasite was *P. falciparum* followed by *P. vivax* and *P. malariae*. In the hypoendemic hill valleys, *P. falciparum* was found in the lower reaches and *P. vivax* in the higher altitudes. In the hypoendemic plain areas, *P. vivax* was the dominant species followed by *P. falciparum* *P. malariae*. The distribution of parasite species from the East to West is basically the same.

5.4 Entomological Surveys : Out of 36 anophelines recorded for the country, only *Anopheles minimus* and *Anopheles fluviatilis* were incriminated as vectors of malaria. Later, *A. maculatus* was incriminated in 1969 and only recently *A. annularis* has been proved to be the fourth vector of malaria in Nepal.

The entomological surveys indicated that the transmission season in the hyperendemic terai and inner terai areas was perennial and in the hypoendemic cultivated terai and hills transmission was seasonal.

5.5 Epidemiological analysis of malarious areas: Epidemiologically, the country could be divided into :

Plain cultivated terai which is hypoendemic with seasonal transmission from June to October;

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+ IPR = Infant Parasite Rate

× CPR = Child Parasite Rate (2-9 Yrs)

Forested terai, foot hill areas and inner terai which are hyperendemic with transmission occurring all the year round;

Hill valley areas which is hypoendemic with spotty and mild transmission occurring from June to October and;

Hilly areas above 4000 feet altitude where no transmission occurs except in a few pockets.

5.6 Parasitology is an important integral service in the ME programme as the diagnosis of malaria is not based on clinical findings but on parasite positive blood films collected from fever cases during regular domiciliary visits by the surveillance house visitors. There are 59 field laboratories to cope with the collection of blood films at an average rate of 1% population per month from the day of taking blood film in the village to the day of receiving back the examination result by field staff, it takes one week in the terai and two weeks in the hills, on the average. To maintain efficiency field laboratories, 10% of all negative slides and all positive slides are cross-checked in the NHQ laboratory, which also undertakes supervision and training of microscopists.

## 6. Achievement of NMEO

Up to the end of 1971, malaria incidence has diminished to a very low level. The incidence in the whole country is now about 2.44 case per thousand population. In the areas under consolidation phase only involving about 80% of the population under coverage it is 0.14 per thousand.

As of 1972, out of a total population of 6.6 million exposed to the risk of malaria, 1.2 million is in attack phase, 4.8 million is in consolidation phase and the remaining population is under limited action.

6.1. Despite the noteworthy accomplishments of the programme, the following factors have jeopardised the time limited schedule of the malaria eradication programme.

The continuous importation of infective cases, especially from Assam and Nagaland, represent 30.6% of all positive cases detected in 1971.

The operational difficulties in tracing some of the positive cases for investigation, radical treatment and monthly follow-up due to constant external movements of the population from north to south or from east to west constitutes a threat to malaria-free areas.

Resettlement activities in the forested terai, particularly those which are unauthorised, result in the appearance of focal malaria outbreaks among the elusive settlers which may pass unnoticed until the infection appears in neighbouring settled villages.

6.2. The ME programme has contributed to a great extent, though indirectly, towards various national development plans connected with land colonisation, resettlement, agriculture

production, industrialisation, rural welfare and education, communications and general economic upliftment including land reform and panchayat development even in the remote territories of Nepal which were formerly highly malarious and, therefore, then untamable.

6.3. The pilot projects for the Integration of Health Services in Kaski and Bara districts: Two dissimilar districts, with respect to topography, extent of basic health services, population, density, communication facilities and other ecological factors were chosen to test the integration of malaria services with the general health services, for entering into the final phase of the M.E. programme viz, maintenance phase, in anticipation of large segments of the previously malarious areas of the country which would be ready to enter into maintenance phase soon. It is envisaged that the existing structure set up and organization of the NMEO would form the basis for the future development and expansion of health posts and peripheral health services.

## 7. Summary

In conclusion it may be mentioned that Malaria, which was a devastating disease in the country in the past, has been tamed which has led to the development of various sectors in the health, economy and prosperity of Nepal. To maintain the gains achieved so far, it is essential to integrate the existing highly developed and skilled set up of the NMEO built all these years at great cost and greater efforts, into the general health services which has to vastly expand for the betterment of the population within national means, as otherwise, there is a great likelihood that the gains achieved could be altogether lost. The experience gained from the malarious areas of the country could also be advantageously projected to the non-malarious hill areas as well, which areas lack even basic health services. In all these great ventures, I hope the support and cooperation of the entire medical profession will be liberally forthcoming.

