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RECURRENCE OF MALARIA IN ERADICATION PROGRAMS

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RECURRENCE OF MALARIA IN ERADICATION PROGRAMS

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The WHO Fourth Report on the World Health Situation (1970) submitted to the 23rd World Health Assembly indicates the achievements of global malaria eradication, but does not attempt to hide its setbacks which illustrate the shortcomings of some malaria eradication programs and the need for continuing vigilance in countries where eradication has been achieved.

Inadequate planning was found to be an important factor of reverses. Planning that does not take into account social and economic circumstances, basic health services, administrative and financial situations, and other relevant points is manifestly insufficient. Human factors such as training are of major influence on the outcome of the program. The achievement of eradication must go together with the understanding of factors that guarantee its maintenance.

Renewal of transmission after it had been interrupted is a serious reversal of any program. It may lead to the creation of multiple foci which eventually give rise to an epidemic. Such "recurrent malaria" may be due either to the presence of previously undetected foci present during the attack phase or to the expansion of one or more foci created from introduced infections. The most common causes of such a situation are: (1) premature cessation of total coverage; (2) defective surveillance operations; and (3) inadequate vigilance in the maintenance phase.

The Ceylon situation is the best example of the speed of possible recrudescence of malaria when a successful eradication program is prematurely interrupted at a critical point. Ceylon provides the best con-

tinuous record of malaria incidence over the past 30 years. This can be shown in the following data. During the period 1934 to 1940 the mean annual malaria morbidity of the population was 545 per 1,000; from 1941 to 1945 the relevant figure was 405 per 1,000. Beginning with 1946 when the island-wide control program started, the data for malaria morbidity (clinical) and the malaria incidence (with positive slides) became available. They were as follows per 1,000 population:

	Malaria morbidity (clinical)	Malaria incidence
1947	207	39
1948	107	7.7
1949	98	7.8
1950	79	3.7
1951	57	3.6
1952	33	2.5
1953	11	3.2
1954	3.5	0.47
1955	0.84	-
1956	0.35	-
1957	0.75	-
1958	0.11	-

In 1959, the beginning of the attack phase, the incidence of malaria in Ceylon was estimated by microscopical examination only, and the relevant figure per 1,000 population fell below 0.00015. The trend of malaria incidence during the past 10 years can be better judged from the following table.

Number of slides examined and some epidemiological indices in Ceylon, 1959-1969

Year	Population	Slides examined	Positive slides	A.P.I. /1,000	Remarks
1959	6,218,000	305,740	1,596	0.26	Attack phase
1960	6,284,000	596,933	467	0.074	
1961	6,553,000	786,307	125	0.016	
1962	6,552,000	148,000	31	0.006	
1963	6,934,000	918.865	16	0.002	Interruption of transmission
1964	7,136,000	1,194,846	29	0.004	Cessation of total coverage
1965	7,292,000	1,248,386	392	0.054	
1966	7,501,000	1,418,282	493	0.059	
1967	9,596,000	1,444,692	1,314	0.14	Localized outbreaks
1968	10,006,000	1,713,076	310,104	31.0	Epidemic
1969	12,114,000	1,550,004	522,704	43.1	
1970	14,000,000	-	589,300	49.3	

After Sivagnanasundram, 1971.

Malaria was successfully controlled in Ceylon using residual insecticides and antimalarials. In 1962-1963 the malariometric indices were at the lowest level but 1964 saw the first setback. By 1968 the epidemic was in full swing. The reasons for this were multiple and could be summarized as follows: (1) inadequate geographical reconnaissance; (2) surveillance data pooled in such a way that persistent smaller foci were not spotted in time; (3) movement of population from areas where malaria remained at a low level; (4) premature cessation of total coverage spraying; (5) delayed remedial measures due to inadequate supervision; (6) shortcomings of epidemiological evaluation and radical cure; (7) and finally much higher vectorial capacity of the Ceylon strain of A. culicifacies. The latter point was particularly stressed by Sivagnanasundram (1971).

It is of particular interest that nearly all positive malaria slides were due to P. vivax. The number of cases of P. falciparum was 189 in 1967, 926 in 1968, and 2,018 in 1969, while only 36 cases of P. malariae were reported during these years.

A different, but not less disappointing situation occurred in some parts of India. Thus, Gilroy noted an increase of malaria incidence on tea estates in Assam where the population is of the order of 800,000. In 1954, the incidence of malaria was 46 per 1,000; it fell in 1963 to 0.1 per 1,000, but during the period 1964-1968 it rose to 1.2 per 1,000 and then to 3.2 per 1,000.

Dhir (1968) in his outline of the progress of the malaria eradication program of India during the past decade showed that the progress was very satisfactory until 1963-1964. Since then the focal outbreaks in the consolidation areas of the country increased in numbers and in extension. In 1965, 1966, and 1967, areas with populations of 12, 17, and 32 million, respectively,had to revert to the attack phase with complete coverage by residual insecticide spraying. In 1967, new criteria for reversion from the consolidation to the attack phase were adopted by the National Malaria Eradication Service of India. These criteria, based on two levels of the index of Annual Parasite Incidence indicate which areas need residual spraying alone and which ones must have a surveillance system in addition to spraying. When those criteria were applied to areas in the Indian program where reversal to the previous phase was needed, the total population affected was 91 million. Geographically these areas were in the states of Gujerat, Madhya, Pradesh, Rajasthan, and in the contiguous zones of the border states of Maharashtra, Uttar Pradesh, Orissa, and Bihar.

In analyzing the reason for the reverses of the Indian program, its Director comes to the conclusion that in many areas the withdrawal of total coverage spraying was premature, the surveillance mechanism inadequate, and the action in the case of reappearance of foci too slow or incomplete because of the shortage of insecticides or budgetary restrictions.

It is obvious that a few positive cases could always be found

during the consolidation phase but if they give rise to secondary cases the danger of the spread of transmission is considerable, especially if the receptivity of the relevant area is high. In these conditions focal spraying is insufficient, and one is faced with the drastic decision to put the whole area under total coverage with all the consequences of this step. Any attempt to deal with such a situation by improved surveillance methods represents a false economy.

The above examples and particularly that of Ceylon illustrate some shortcomings of the present strategy of malaria eradication, especially in the consolidation phase. These have been cogently argued by Gabaldón (1969). There is little doubt that in areas where the receptivity is high, a much longer total coverage by spraying should be maintained, particularly if the surveillance system is not perfect. Naturally, the relevant expenditure will be higher, but this should be regarded as a sound insurance against a disastrous reversal which puts the whole program back to square one. Moreover, it will not be premature even in the consolidation phase of a program with high vulnerability to organize the "second degree prevention" measures (Gabaldón, 1969), which will carry a heavy responsibility during the maintenance phase.

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