



BLUEPRINT for MALARIA ERADICATION in the U.S.

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The eradication of malaria as a significant public health problem in the United States has been proposed as a cooperative enterprise of the State Departments of Health concerned and the U. S. Public Health Service. Through this joint effort, an attempt is being made to reduce the incidence of the world's No. 1 communicable disease to virtual extinction in a large, defined area. Many specific and non-specific beneficial agents affecting the transmission and maintenance of malaria have produced a favorable set of circumstances which make such a program feasible. The health organizations of the affected areas, therefore, are collectively "striking while the iron is hot."

SELECTION OF PROCEDURES

In selection of procedures, three approaches were considered: (a) the elimination of malaria parasites in human residents of the areas; (b) the complete

annihilation of the insect vectors of malaria; and (c) attritional eradication effected by concurrent reduction of malaria parasites and vectors to the point where general malaria transmission cannot occur.

There are certain inherent weaknesses in the first two methods. The lack of suitable means for mass destruction of the parasites in man by medication and the practical difficulties for such therapeutic administration to the general public in affected areas eliminate the first. The technical and operational difficulties connected with any attempt at country-wide eradication of native anopheline species, as well as the prohibitive cost of a program, eliminate the second. The last approach, therefore, was selected as the only one practicable for achieving malaria eradication in the United States. It is believed to be the most economical and efficient plan because it incorporates

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the advantages of the other alternatives, without their difficulties.

Federal, state, and local health agencies generally have accepted the challenge and have embarked enthusiastically on the five-year program of major effort. The administrative pattern adopted has provided for establishment of broad general policies within the mandates of Congress and under terms of federal appropriations. Actual administration of authority and management of operations is vested in the state departments of health. Technological information is developed and tested through laboratory and field investigations. Information is disseminated by means of printed and audio-visual materials and personal contacts. The uniform use of recent developments and recommended practices is promoted by centralized training courses for key personnel. These are followed by decentralized training of personnel in the lower echelons. This concept provides for a general and intelligent application of fundamental technical principles. Also, variation in procedures due to local circumstances, where desirable, are allowed. The plan of organization permits the establishment and application of national policies to the program as a whole. Administration invested in state and local departments of health encourages permanent and active malaria control organizations at these levels.

CONTROL METHODS

In the control program principal reliance is being placed (1) on killing of adult anophelines in human habitations using residual insecticides and (2) improved diagnosis and treatment of malaria cases. The organized field activity — DDT residual spray applications in houses and other human habitations — is conducted by the various State — CDC Activities organizations in the areas of traditional greatest malaria endemicity. The usual unit of operation is the county. Projects are mostly county-wide because of substantial local financial participation. The DDT treatments consist of applying emulsion to all interior wall surfaces and porches

of houses and other structures to obtain a coating of approximately 200 mg. of DDT per square foot. In most areas two treatments per season have been provided. However, there is now a trend towards a single spray per season (See Special Projects, p. 57). In marginal areas a system of "spot spraying" is followed, in which only the houses of known malaria cases and nearby residences are sprayed. Where actual cases of malaria are known to exist, treatment of entire premises is practiced. Complete spraying of premises on a routine basis is desirable, of course, for more comprehensive anopheline kill. It appears, however, that a high degree of malaria control is obtained with only routine house and privy spraying. This practice conforms to the expressed purpose of utilizing available federal funds to reduce the over-all transmission of the disease. Larger local financial participation can be used to extend coverage over entire premises.

ENTOMOLOGICAL EVALUATION

Direct entomological evaluation is obtained by afternoon inspections of random samples from sprayed premises at varying periods subsequent to spray treatment. Experience indicates that *Anopheles* mosquitoes are eliminated from practically all treated houses if the DDT has been applied properly.

SPRAYING BY HOUSEHOLDERS

The increased use by householders of both space and residual type insecticides is being encouraged. The mass awareness of, and use of, insecticides by the public in their homes strikes a mighty blow at the specific insect vectors of disease.

EPIDEMIOLOGICAL ACTIVITIES

Improved knowledge of current malaria prevalence is vital to both intelligent direction of the insecticidal program and a concentrated attack on the detection and treatment of actual cases. To obtain this knowledge epidemiological field services are being strengthened. Medical and nurse officers are being assigned to epidemiologists in states where malaria

is most prevalent. The mission of these officers is to develop better diagnosis and reporting by practicing physicians, and to promote the use of the best available antimalarials. A follow-up of reported cases serves to accent accuracy in diagnosis and permits direct exposition of modern methods of treatment. Public health nurses are furnished to supplement available medical talent in malaria epidemiology. The nurses will also serve as stimuli to the general public health nursing program in encouraging a larger proportion of existing malaria cases to seek medical attention. It is expected that these field activities will serve to delineate areas of probable malaria transmission. Concentrated entomological study in these areas will follow. Procedures are thus established for a logical progression to point control efforts on the country's foci of residual infection. This is of obvious importance in the eradication effort.

SPECIAL STUDIES

In a few selected areas special studies are to be undertaken in order to determine intimately the epidemiology of malaria, particularly with respect to the maintenance of the disease in human populations. These "listening posts" will be located in areas of previous hyperendemicity where transmission factors can be analyzed and where malaria will be most likely to return. In addition to a thorough study of the human cases, an ecological appraisal of the vector species will be undertaken. In this way, circumstances tending to permit transmission of the disease and factors associated with malaria recession will be determined. This information may help to break the links in the chain of malaria transmission.

FUTURE PLANS

The first year of the present program has ended. Control operations are underway in approximately 80 percent of the 440 most malarious counties of the country (counties having five or more cases per 100,000 during 1938-1942). Present plans call for the early extension of operations

to the remainder of these counties and to isolated malaria foci in marginal territory. Sufficient epidemiological and entomological data on the results being obtained should be available at about the mid point in the program. This knowledge will allow a thorough evaluation of progress. Also, possible revisions in general procedures or in selection of project areas will be considered.

Although prospects for the success of the eradication effort by the end of 1951 are very bright, it is not believed that its success will end the need for malaria prevention work in this country. Programs in many areas will, no doubt, be continued on a "maintenance basis". Constant supervision will be necessary to detect any localized revival of malaria so that immediate steps may be taken to prevent its spread. Each state department of health in the area concerned should continue to support a minimal program sufficient to detect and control outbreaks. Highly mobile types of staff and equipment will be essential. The great sensitivity to malaria among people as they gradually become unaccustomed to its ravages will assist this work in the intelligence phases and in elicitation of public support. Reintroduction of the disease must be considered. It is encouraging to note the significant plans for strengthening malaria control in Mexico through initiation of a large DDT residual spray program. Technical personnel for this work are now being mobilized. Many other countries are also devoting strenuous efforts along similar lines (See Special Projects p. 57). Since malaria introduced in other areas will not likely be transmitted, ports-of-entry in the southeast would be the principal sources of concern. Controlling transmission in the traditional malaria belt would be the task of the mobile units. It is hoped that in the years to come malaria may be included in the same category as yellow fever and dengue - diseases which are prevented from becoming problems in this country by supervision and quarantine activities.