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The Secretary of the Expert Committee on Malaria
has the honour to communicate hereunder
the following note:

ECONOMIC AND SOCIAL EFFECTS OF MALARIA CONTROL
WITH SOME SPECIFIC INSTANCES FROM TAIWAN

by

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(Item 4 of the Provisional Agenda)

1. INTRODUCTION

Perhaps it is superfluous to introduce a discussion of this title in a meeting attended by specialists whose very employment and pre-occupation with malaria control reveals an obvious recognition of its economic and social effects. Governments and other agencies initiating or supporting large malaria control projects normally weigh these factors before committing funds so eagerly sought for many other enterprises. Justifications are usually requested in connexion with proposed malaria control schemes. The public-health officials responsible for drawing up such justifications are already aware of, and excited about, the humanitarian benefits which will result from inauguration of country-wide malaria control efforts. Therefore they easily become enthusiastic, or over-enthusiastic, in citing a variety of other benefits which may accrue from use of malaria control practices. Some of these expected benefits may be very important in eliminating physical and financial suffering of individual citizens, but they may have only a fallacious value in the gross economy of the country concerned. We propose to list some economic and social benefits most commonly claimed for malaria projects, to cite some Taiwan malaria programme

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observations, and to consider the extent to which the interpretation of malaria control effects may safely be made by public-health specialists or by specialists in other disciplines.

2. ECONOMIC AND SOCIAL EFFECTS COMMONLY ATTRIBUTED TO MALARIA CONTROL PROJECTS

Effects predominantly economic

- (a) Utilization or reclamation of land otherwise untenable because of high malaria prevalence.
- (b) Increase of efficiency otherwise lost during incubation and convalescent periods of malaria attack.
- (c) Prevention of premature death and loss of investment in individuals who die before, or early in, their productive stage.
- (d) Saving in actual costs of anti-malaria drugs.
- (e) Savings of man-days otherwise lost through malaria attacks.
- (f) Savings in direct costs and overhead investments in hospitals or dispensary facilities which must be maintained for treatment.
- (g) Enhanced attractiveness for the foreign capital investment.
- (h) Avoidance of costs of conventional, pre-DDT era methods of malaria control, such as larviciding or permanent ditching.

Effects predominantly social

- (i) Decrease in death rate and attendant effects on population pressure.
- (j) Avoidance of "reproductive wastage"; actually an infant mortality corollary of "i" above.
- (k) Relief of imbalance of population, through opening of new lands for migration from over-populated areas (Italy-Sardinia; Indonesia).
- (l) Reduction of absenteeism among schoolchildren.
- (m) Political benefits from popular community programme originated by government but implemented through active local participations.
- (n) Elimination of noxious vermin (bedbugs, cockroaches) and potential transmitters of disease other than malaria (fleas, lice).

3. OBSERVATIONS FROM AN EPIDEMIC AREA IN TAIWAN

As for most malarious areas, objective data relating to economic and social effects of malaria in Taiwan are either fragmentary or unavailable. However, the occurrence in 1953 of a malaria epidemic in Kao-Shu township of southern Taiwan permitted some accurate measurements of malaria's impact on a community. Kao-Shu township, in Ping-Tung hsien of southern Taiwan, has a population of approximately 21,000 of whom some 80 per cent. are engaged in agriculture. A malaria survey of 157 school and pre-schoolchildren in this township in May, 1952, showed a spleen rate of only 10.2 per cent. The township was therefore given a low priority. It was scheduled for spraying in 1954 but not in 1953. However, an unexpected increase in malaria morbidity was revealed in October, 1953. Five villages were heavily hit by malaria. The spleen and parasite rates in 463 schoolchildren of these five villages were 60.5 per cent. and 30.7 per cent. respectively. Emergency spraying measures were scheduled immediately.

An intensive survey was made to measure the impact of the epidemic. Visits were made by staff members of the Malaria Institute to 854 individual household units with family members totalling 5,256 persons (99.4 per cent. of the people in the five villages). Questioning of responsible members in each household yielded data regarding primary cases of malaria, expenses of treatment, work-days lost by patients, labour hired from outside to compensate for local incapacitation, and miscellaneous expenses directly or indirectly associated with the malaria attacks. The findings among the 5,256 people included in the survey are summarized below.

(a) Primary malaria attacks: Three thousand and five (3,005) persons contracted new infections during the **four** months from July to October, 1953. This represents 57.2 per cent. of the population of 5,256.

(b) Expenses of treatment of malaria cases: The 5,256 people spent a total of NT\$96,333.90 for malaria treatment during July-October. The total expenditures can be further sub-divided to show the amount spent for doctors' fees, health station charges, and cost of anti-malaria drugs (NT\$87,560.90), and the amount spent for herb-doctors' treatments and temple visitations to obtain relief (NT\$8,773.00).

(c) Loss of work-days of patients during acute febrile stage and convalescence: Excluding children under 10 years of age and all children registered for school attendance, the total period of incapacitation in the five villages amounted to

17,680 man-days during July-October. For those accustomed to calculating potential monetary losses, the lowest local wage for unskilled labour is NT\$8.00 per day.

(d) Outside labour hired to compensate for labour loss under "c" above: The epidemic period coincided with the autumn rice-crop harvest. Families affected by the epidemic engaged outside labour totalling 2,284 man-days.

(e) Miscellaneous expenses: Included were costs of special food commonly prepared for invalids, charges for religious acts prescribed by local superstition, and funeral expenses of two persons whose deaths were caused by or aggravated by malaria attacks. The total expenditures in this miscellaneous category amounted to NT\$17,015.

It should be noted that the conditions producing the unexpected outbreak of malaria in Kao-Shu township are poorly understood, but the environmental circumstances of that particular community do not show marked differences from hundreds of similar foot-hill communities in Taiwan. With the total per capita cost below NT 4.00 for malaria control in Taiwan, the desirability of avoiding such catastrophes is obvious.

4. DISCUSSION

Dr. Stacy May, economist for the Rockefeller Offices, stated in a most provocative address before the American Society of Tropical Medicine and Hygiene, "In a true sense it may be said that tropical medicine is the midwife of economic progress in the underdeveloped areas of the world. Where mass diseases are brought under control, productivity tends to increase - through increasing the percentage of adult workers as a proportion of total population, through augmenting their strength and ambition to work, and in many cases by actually making possible the opening of new or the reclaiming of abandoned land previously untenable because of the prevalence of disease." These economic benefits cited for tropical medicine as a whole would seem to cover only categories (a), (b) and (c) in paragraph 2 above. From the country-wide economic standpoint, item (d) (savings in anti-malarial drugs) may also be added, inasmuch as these require the outlay of foreign exchange in countries where they are not produced.

To the economists or administrators concerned with national economy, the effects of malaria may be limited to gross increases or decreases in productivity.

The mere claim of millions of man-hours saved or of lowered rates of premature death may not be convincing. Take, for example, the situation in Kao-Shu township of Taiwan, or in the areas for which economic effects were claimed in paragraph 2 above. We are immediately impressed by the fact that malaria may greatly affect the economy of the individual, even to catastrophic proportions, without disturbing a country's economic base. Thus, certain Kao-Shu farmers suffered 17,680 man-days' incapacitation, and they employed others for 2,284 man-days' compensatory labour. But this did not result in any loss of rice through non-harvest. The malaria-stricken farmer who paid wages to outside workers may have been unable to afford such an individual loss, but the outside workers enjoyed more income than otherwise, and harvested the rice without serious effect upon Taiwan's gross crop production.

In an overpopulated country such as Taiwan where surplus labour can no longer be accommodated on the already intensively cultivated land, the malaria control programme must be emphasized for its social significance, relieving people's suffering from disease rather than contributing immediately to the nation's productivity. Professor Gunnar Myrdal, Executive Secretary of the Economic Commission for Europe, pointed out before the Fifth World Health Assembly, "The success of a health programme is entirely dependent upon whether it is integrated into a social process of general economic development or applied to a state of economic stagnation. The economic value of preventing premature death, to take the simplest case, depends entirely upon whether such an economic development is under way as will ensure productive work for the greater number of people we thus keep alive."

Doctor Myrdal's reasoning may well affect the interpretation of value of man-days saved through malaria control. Let us say that Thailand estimates 400,000 malaria cases annually among persons of working age, and each case averages 7.6 man-days lost from work. Potentially the application of malaria control may save about three million man-days per year in Thailand. But how shall we state the savings in bahts, or dollars, or any other currency? May we safely multiply the man-days saved by the daily wages prevailing when no malaria control is being carried out? Would all of the sick persons have been employed if they were well? If workers in 854 households lose 17,680 man-days at the peak of the rice-harvest due to malaria do they rush out and engage other workers for an equal number of man-days' work? In Taiwan they only engaged substitute labour for 2,284 man-days

(12.92 per cent.). The close examination of objective field data reveals many complexities in economic interpretation, and may well send the malaria specialist in search of a co-operative economist to aid him in his analysis.¹ Such professional collaboration will emphasize the need for more, rather than less, information on the effects of malaria control projects. Closer attention to the recording of deaths, absenteeism, costs of treatment, losses of efficiency, and losses in productivity may result from the combined scrutiny of data by the economist and the malariologist.

If the economist dampens our fiscal ardour, shifts the decimal point to the left in our calculation of country-wide economic benefits of malaria control, and limits us to factors involved in gross productivity, he will at least agree that the loss of man-days, the hiring of substitute labour, and the costs of malaria treatment are of grave importance in the distribution or mal-distribution of community income. Any inequities resulting from malaria attacks thus assume importance on the social side of our ledger. A malaria control programme can ensure that a hard-working farmer will not have his labour lost through the whim of a sporozoite-laden anopheline. This may be an important factor in stabilizing a rural community, and becomes important even at the international level when rival ideologies are competing for the minds of men.

One cannot mention the social effects of malaria control, and its lowering of the death rate, without facing the spectre of population pressure. The opening of malarious lands for increased production or for migration from over-populated areas may not keep pace with the populations resulting from the elimination of the disease. The most challenging reaction to this question was that shown by Dr. Paul Russell in his address "Malaria and Society" delivered before the National Malaria Society of the United States in 1950. After a reminder that there is no moral alternative on the part of public-health workers, Dr. Russell urged malaria specialists to push on with their work, while striving with specialists in other disciplines to attack the population problem at its root. The Rockefeller economist previously mentioned (May, 1954) treated the same question with bridled optimism, recognizing that the public-health worker must progress while awaiting the removal of trade barriers, increased agricultural production, and population policies which must contribute to the ultimate solution.

¹ The authors are grateful to Mr. Norman Wycoff, Economic Analyst of FOA/CHINA, for definition or clarification of several technical points.

No-one participating in the malaria control work in Taiwan can close a discussion of the social effects of that programme without mentioning an additional by-product, extremely significant in its implications. This is the possibility that the malaria work in each township will be the "foot-in-the-door" for many other community programmes in public health and other fields. Great efforts, involving some temporary sacrifices of expediency, have been made to keep the Taiwan programme decentralized. Thus, the township office and its associated health station have been given responsibility for their local malaria control budget, which the township provides at the rate of NT\$1.00 per capita. The township supervisor and foremen for the 60-day spraying programme in each community come from the staff of the health station or township office. The operators (spraymen) and helpers are recruited and employed in each community to spray the houses of their neighbours. Residual spraying operations, as we are so well aware, must take the spraying squads into every house if the programme is to succeed. The elimination of household pests and of the threat of malaria makes the programme extremely popular. The accomplishment of a successful programme, with such high levels of local participation, should have a salutary effect on local willingness to undertake new projects to which there may be more resistance. The social significance of this fact in areas where there may be some inferiority complex in independent community action should not be underestimated. As Sir George Newman wrote 35 years ago, "Let men once feel that external circumstances control their fate, and their attitude to reform and progress is one of despair. Let them once recognize, on the other hand, that in large and increasing measure they are masters of their own destiny, and their life takes on a new, more hopeful and purposive aspect..." Let us therefore look beyond the horizons of our microscopes and compression sprayers and contribute to a "more hopeful and purposive aspect" in the communities in which we work.

If, in our administrative justifications, we are asked to list the monetary benefits to be expected from the malaria control programme, let us continue to cite those effects which are of vital economic importance to the individual and the community, regardless of their pertinence, by technical definition, as major contributions to the national economy. Should we be challenged, let us assert ourselves in a proper evaluation of the citizen's right to protection from the insidious effects of malaria, whether epidemic catastrophe or perennial debilitation. Such a combined socio-economic defense may require more effective documentation than we have been providing in the past. If we have been neglecting either the quantitative or qualitative evaluation of malaria programme benefits, let us give this subject the attention it so richly deserves.

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