WORLD HEALTH ORGANIZATION

ANTI-MALARIA CO-ORDINATION BOARD

Fourth Meeting
Kuala Lumpur, 1-4 December 1959

REPORT OF THE FOURTH MEETING OF THE
ANTI-MALARIA CO-ORDINATION BOARD OF BURMA,
CAMBODIA, LAOS, THE FEDERATION OF MALAYA,
THAILAND AND VIET-NAM

Part I
INTRODUCTION

The establishment of the Anti-malaria Co-ordination Board was recommended by the Inter-country Malaria Conference in Phnom-Penh, Cambodia\(^1\), convened on 10-12 January 1956 by the World Health Organization. The conference was attended by the representatives of the Governments of Cambodia, Laos, Thailand and Viet-Nam and observers from the United States Operations Missions (USOM) in those countries. It was recommended that the meetings of the Board be rotated among the co-operating countries and that other neighbouring countries be encouraged to join the Board.

The first meeting of the Anti-malaria Co-ordination Board was convened in Saigon, Viet-Nam\(^2\), from 15-19 November 1956 and attended by representatives of the five member countries Burma, Cambodia, Laos, Thailand and Viet-Nam, and by observers from the USOM and by WHO staff from the South-East Asia and Western Pacific Regional Offices. The second meeting took place in Bangkok, Thailand\(^3\), from 11-13 December 1957. At this meeting the Federation of Malaya was welcomed as the sixth member country of the Board. An observer from UNICEF Asia Regional Office also attended.

\(^1\) The report of the Inter-country Malaria Conference in Phnom-Penh is contained in document WHO/Mal/171.

\(^2\) The report of the first meeting of the Anti-malaria Co-ordination Board is contained in document WHO/Mal/184.

\(^3\) The report of the second meeting is contained in document WHO/Mal/195.
The third meeting of the Anti-malaria Co-ordination Board was convened in Rangoon, Burma\(^1\), from 1-4 December 1958. It was attended by representatives of the six member countries, by observers from USOM, UNICEF Asia Regional Office and by WHO staff from the South-East Asia and Western Pacific Regions.

The Regional Director of the Western Pacific Regional Office, on 21 August 1958, assigned a permanent secretary for the Anti-malaria Co-ordination Board, having obtained the agreement of the Governments represented on the Board. Saigon was determined as provisional duty station of the Board secretary.

The fourth meeting of the Anti-malaria Co-ordination Board was held in the Dewan Tungku Abdul Rahman, Kuala Lumpur, Federation of Malaya, from 1-4 December 1959. The Minister of Health and Social Welfare of the Federation of Malaya, the Honourable Dato Ong Yoke Lin, P.M.N. inaugurated the meeting.

The meeting was attended by representatives of the Governments of the Union of Burma, Cambodia, Laos, the Federation of Malaya, Thailand and Viet-Nam; observers from the Federation of Malaya, the State of Singapore, the University of Malaya, the Royal Naval Base in Singapore, the United States Operations Missions in Cambodia, Laos, Thailand and Viet-Nam and the UNICEF Asia Regional Office, also WHO staff from the South-East Asia and Western Pacific Regions. Messages were read from the directors of the two WHO Regional Offices and addresses were given by the Chief of Field Operations and Programming Division, UNICEF Asia Regional Office, and by the Malaria Eradication Project Manager of the USOM in Viet-Nam (on behalf of the four participating United States Operations Missions). The speakers expressed their satisfaction with the steady progress which had been made during the past year towards the achievement of malaria eradication but emphasized that co-ordination of effort was more important than ever before, to overcome technical, organizational and financial difficulties.

\(^1\) The report of the third meeting is contained in document WHO/Mal/216.
The following officers were elected:

Chairman: Dr Mohamed Din bin Ahmad,
Federation of Malaya

Vice-Chairman: Dr Keo Phann, Cambodia

Rapporteurs: Dr M. I. Haji Mohamed,
Federation of Malaya
(English language)

Dr Nguyen-Tuong, Viet-Nam
(French language)

A drafting committee assisted the rapporteurs.

The provisional agenda was adopted and the Board was in session for three full days. Half a day was devoted to field demonstrations of anti-malarial works within the municipal council limits of Kuala Lumpur, half a day to a field inspection of anti-malarial works at Klang, Port Swettenham and Bukit Cheeding.

The participants enjoyed the hospitality of the Honourable Dato Ong Yoke Lin, Minister of Health and Social Welfare, and of the President and Fellows of the Society of Medical Officers of Health (Malayan Branch).

The Board noted with regret the unavoidable absence, due to illness, of Dr D. K. Viswanathan, WHO Senior Malaria Adviser of the South-East Asia Region, and expressed its wishes for his speedy recovery.

The meeting was closed by Dr M. I. Haji Mohamed, Deputy Director of Medical Services (Health).
LIST OF PARTICIPANTS

**Burma**
Dr Ba Sain, Malarialogist, Region No. 1.

**Cambodia**
Dr Keo Phann, Directeur du Service Antipaludique.
Dr Tien Meng, Officier de Santé en service au Service antipaludique.

**Laos**
Dr Khamleek Vilay, Directeur du Programme antipaludique.
Dr Pheng Miseiphon, Malarialogist.

**Federation of Malaya**
Dr Mohamed Din bin Ahmad, Director of Medical Services.
Dr M. I. Haji Mohamed, Deputy Director of Medical Services (Health).
Dr J. A. Reid, Senior Entomologist, Institute for Medical Research.
Dr A. B. G. Laing, Malaria Research Officer.

**Thailand**
Dr Udaya Sandhinand, Director of Malaria and Filariasis Control.
Dr Luang Ayurakitsosol, Malaria Consultant.
Dr Bhavongvit Tanticharern, Southern Regional Malaria Officer.

**Viet-Nam**
Général Tran Tu Oai, Administrateur Général du Programme d’éradiation du Paludisme.
Dr Nguyen-Tuong, Adjoint Technique à l’Administrateur Général.
Dr Le-Du, Chef du Service des Opérations à l’Administration Général.

**Observers**
Mr Anthony J. Kranaskas, Chief, Public Health Division, USOM, Cambodia.
Dr Maynard S. Johnson, Malarialogist, USOM, Laos.
Dr Prayoon Saibamroong, Malaria Consultant, USOM, Laos.
Dr Melvin E. Griffith, Chief Malaria Adviser, USOM, Thailand.
Mr John E. Taylor, Malaria Eradication Project Manager, USOM, Viet-Nam.
Dr J. McDowell, Malaria Adviser, USOM, Philippines.

Mr Brian Jones, Chief of Field Operations and Programming Division, UNICEF Asia Regional Office, Bangkok.

Dr S. Narayanan, Senior Health Officer, Kota Bahru, Kelantan, Malaya.

Dr Ng. See Yoke, City Health Officer, State of Singapore.

Dr Ivan Polunin, University of Malaya, Department of Social Medicine.

Surgeon Commander, L. H. Duthie, Royal Naval Base, Singapore.

WHO Secretariat

M. J. Colbourne, Regional Malaria Adviser for the Western Pacific.

Professor C. Y. Chow, Regional Entomologist for the Western Pacific.

Dr W. W. Yung, Area Representative, Singapore.

Mr S. Sundararaman, Entomologist, Burma.

Dr F. Ronnefeldt, Senior Malaria Adviser, Cambodia.

Dr L. Cervone, Entomologist, Cambodia.

Dr J. H. Pull, Senior Malaria Adviser, Viet-Nam.

Mr F. Lachance, Entomologist, Viet-Nam.

Dr W. H. Huehne, Secretary of the Anti-malaria Co-ordination Board.

Miss M. Moore, Administrative Assistant, Western Pacific Regional Office.
AGENDA

1. Opening of the meeting. Inauguration by the Minister of Health of the Federation of Malaya.

2. Message from the Regional Director, WHO Regional Office for South-East Asia.

3. Message from the Regional Director, WHO Regional Office for the Western Pacific.

4. Address on behalf of the United States Operations Mission in the countries represented on the Board.

5. Address by the Chief of Field Operations and Programming Division, UNICEF, Asia Regional Office, Bangkok.

6. Election of Chairman, Vice-Chairman and Rapporteurs.

7. Adoption of the Agenda.

8. Country malaria programme. Discussion of the circulated reports.

   9.1 Report of the Board Secretary.
   9.2 Discussion of the report.
   9.3 Target dates and liaison.
   9.4 Duty station of the Board Secretary.
   9.5 Training centres.

10. Resolutions adopted at the Third Meeting in Rangoon.

   11.1 Presentation.
   11.2 Discussion.

Subjects

A. Burma - Methods of measuring interruption of transmission.

B. Cambodia - Importance of secondary vectors.

C. Laos - Practical co-operation along international borders.

D. Malaya - The part of permanent anti-malaria work and anti-larval measures in malaria campaigns.
E. Thailand  - The cost of surveillance.

F. Viet-Nam  - Problems of shifting cultivation.

12. Resolutions.

13. Date and place of next meeting.

14. Other business.

15. Adjournment.
Part II

REPORT ON THE DISCUSSIONS

A. Country Malaria Programmes

1. General Review

In forming the Anti-malaria Co-ordination Board, the countries of the South-East Asia peninsula had recognized that malaria was among the most important problems of their peoples and Governments; that modern advances in anti-malaria methods had presented an unparalleled opportunity to rid themselves of this disease; and that geographic continuity, environmental similarities, and socio-economic inter-relationships demanded their fullest possible co-operation towards malaria eradication, if this historic goal was to be achieved.

Organized malaria control had a long background in this region, especially in Malaya, though residual house-spraying had been applied only in the present decade. National malaria control programmes were definitively converted to the objective of eradication in Burma, Laos and Thailand in 1957. This objective was also accepted by Cambodia in 1957 and by Malaya and Viet-Nam in 1958. The anti-malaria service was integrated with other health services to some extent in Cambodia and Malaya; was separate but responsible to the Ministry of Health through the Director of Health Services in Burma, Cambodia, Thailand and Laos; and was a semi-autonomous service, directly responsible to the Secretary of State for Health in Viet-Nam.

The principal operational attack in the established malaria eradication programme was universally through an intensive residual house-spraying campaign to destroy malaria-carrying mosquitoes. The importance of a thorough knowledge of the vector species, their habits and vulnerable characteristics, could not be over-emphasized as necessary to effective and economic control. The primary vector species had been considered to be Anopheles minimus in all member countries, except Malaya where Anopheles maculatus had that distinction. These species were notably associated with hilly areas; in other situations, a variety of secondary vectors (in the sense of having less general importance) had been described. Chief among the latter might be mentioned Anopheles sundacous along sea-coasts, Anopheles balabacensis associated with forests, and Anopheles letifer, Anopheles umbrosus and dark-winged Anopheles barbirostris in Malayan- plains.
The work plans were basically similar among the member countries: The spraying campaign was necessarily guided and evaluated by standard malariometric surveys in beginning operations. As house-spraying progressed in stopping malaria transmission, surveillance (also a programme of total house-coverage) was introduced to make sure transmission was stopped and not resumed, to treat malaria infections, to find and eliminate malaria foci, and to determine when eradication has been achieved. The attack on the vector was largely through house-spraying, using hand-operated equipment to apply dosages of 2.0 gm/m² technical grade DDT or 0.5 gm/m² technical grade dieldrin. The surveillance process included the treatment of all fever cases with chloroquine, often in combination with pyrimethamine, at standard dosages, and further treatment with primaquine for radical cure, where indicated and feasible.

Schedules of operations to reach the end-point of malaria eradication must be planned on a multi-year basis, with adequate staffing and funding throughout the required number of years. This had been recognized by the member countries, and projected requirements, where necessary, had been planned with bilateral and international assistance. The programmes were assisted by WHO and UNICEF in Burma, by WHO and USOM in Cambodia and Viet-Nam, and by USOM in Laos and Thailand. Malaya was planning a pilot project with WHO assistance. Recruitment and training of the technical staff for malaria eradication were problems of serious proportion in the member countries. Progress had been made toward answering these problems, but a shortage of well-trained personnel was hampering the essential technical guidance in some areas now in operation, while delaying initiation of work in others.

Public information was an important part of the malaria eradication programmes and was being developed through the usual media on a large scale, including a variety of audiovisual materials, such as motion pictures, film strips, posters, wall newspapers, leaflets and other productions. National and international information services, health education divisions, and similar agencies were suggested as sources of assistance. The Thailand report submitted to the meeting described a special audiovisual service set up by the Government and USOM to produce materials for malaria eradication and other projects. The Viet-Nam report included a variety of interesting, informative publications; exchanges of such representative materials would be especially beneficial among the member countries of the Board.
2. Present status

The phases of malaria eradication programmes had been defined by the WHO Expert Committee on Malaria as (1) planning and preparation, (2) attack (chiefly through residual house-spraying), (3) consolidation (chiefly through surveillance) and (4) maintenance (when malaria eradication was achieved by technical definition and further safeguards were relegated to the general health services). The phases reached to date varied considerably among the member countries.

Malaya was at an early stage in planning with the expectation of beginning a pilot malaria eradication project in 1960. The results of this initial trial would determine the future schedule toward malaria eradication. Viet-Nam was in transition from the planning and preparatory work to the first stage of attack. Cambodia was well advanced in the attack phase and was planning to institute surveillance in some areas next year. Burma and Laos remained essentially in the attack phase, but had introduced surveillance leading into consolidation. Thailand was in process of instituting surveillance in all operational areas, with spraying continued only in areas showing evidence of indigenous malaria or a significant malaria hazard.

The status of the several programmes, in terms of protected population, could be tabulated as follows:

**Figures in Millions**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Spraying</td>
<td>Spraying and surveillance</td>
</tr>
<tr>
<td>Burma</td>
<td>20.0</td>
<td>12.5</td>
<td>7.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Cambodia</td>
<td>4.8</td>
<td>1.0</td>
<td>1.8</td>
<td>-</td>
</tr>
<tr>
<td>Laos</td>
<td>3.0</td>
<td>3.0</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>Malaya</td>
<td>6.5</td>
<td>3.5</td>
<td>3.1*</td>
<td>-</td>
</tr>
<tr>
<td>Thailand</td>
<td>23.6</td>
<td>14.0</td>
<td>-</td>
<td>7.0</td>
</tr>
<tr>
<td>Viet-Nam</td>
<td>13.5</td>
<td>11.0</td>
<td>4.6</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>71.4</strong></td>
<td><strong>45.0</strong></td>
<td><strong>17.1</strong>*</td>
<td><strong>9.7</strong></td>
</tr>
</tbody>
</table>

*Population protected in Malaya is approximately two-thirds urban and one-third rural and is protected by anti-larval and other measures.*
The extensive administrative and technical personnel required to carry out the anti-malaria activities necessary to protect such large numbers of people were clearly shown by the Viet-Nam report of its plans for general direction, epidemiological service, evaluation, and administrative and operational services. The proportional relationships of technical personnel to the population to be protected were further elucidated in the Thailand report of its plan for headquarters, laboratory and field units. The other countries of the Board had, of course, developed similar organizational structures to perform the basic functions of administration, operations and evaluation. The technical training requirements were proportionately large in all of the member countries, including advanced training abroad for key officials, standard national courses for malaria technicians, and local training for a variety of operational personnel.

All countries were making progress toward adequate budgets for the accomplishment of their present work plans, through national appropriations and international and bilateral assistance where required. Equipment and supplies were sufficient, though the problems of maintenance and logistics were severe in programmes which had extended into the attack phase in areas remote from main centres and communication lines. Mobile repair units, as reported by Viet-Nam, had been found useful in such areas.

The results being obtained this year presented a wide variety of situations, both nationally and locally; the general picture remained encouraging, but distinctly challenging. The preponderance of Anopheles minimus as the primary vector and its susceptibility to control by residual insecticides, had enabled a striking reduction of malaria to be accomplished in large areas of Burma, Cambodia, Thailand and Laos. Viet-Nam was just entering the attack phase, but it might be anticipated that A. minimus would respond there as satisfactorily. Malaya was still in the planning phase. Some of the secondary vectors were equally well controlled by the standard house-spraying methods; however, distinctly refractory malarious situations had been revealed as the work progressed toward malaria eradication in some of the member countries of the Board.
The only evidence of physiological resistance of a vector among the several countries appeared to be the increasing tolerance of *Anopheles sundaicus* to DDT in the Arakan Coast of Burma. Dieldrin was now being used in that area with satisfactory results. The chief difficulty at present seemed to centre on the resting habits of *Anopheles balabacensis* which made it poorly vulnerable to residual house-spraying. Cambodia had provided especially useful data on this species and studies were also under way in Thailand. In areas where the poor response of this species to house-spraying was the cause of failure to stop transmission, Cambodia had conducted experiments in eliminating malaria by mass treatment, with promising results.

There were also situations, as pointed out (see B. (c) on page 14) in two districts on the Burma-Thailand and the Cambodia-Thailand borders, where the persistence of malaria, despite repeated house-spraying, was not technically explicable on present data. Investigations of such cases which were fortunately relatively limited, was certainly a priority requirement of great interest to all members of the Board.

3. Future plans

Malaria eradication programmes, where established, would continue with house-spraying and other activities, as indicated above, with some changes in organization and further investigation of special problems which might require modifications of anti-malaria techniques in some areas.

Burma planned to give special attention to extension of the programme along its border areas where some districts were still not included. The Government was also proposing a scheme of local participation which would draw communities and health services more directly into the spraying and surveillance activities, under supervision by technical malaria eradication personnel.

Cambodia would continue its present total coverage of malarious areas with spraying and evaluation, and planned to establish surveillance where surveys showed interruption of malaria transmission. Further researches would be conducted in areas where it had not been possible to interrupt transmission, with a view toward possible alteration in spraying techniques, use of drugs in medicated salt or other mass treatment procedures, or a combination of such attacks on vector and parasite.
Laos would extend its attack phase operations, as far as possible, towards total coverage, with special attention to border areas not yet reached. Surveillance was being introduced into all areas which had had two years of house-spraying, irrespective of survey results.

Thailand would reorganize its surveillance programme in line with the analysis of extensive surveillance data collected in all operational areas in 1959 to pinpoint malaria foci for special attention. Spraying was being continued only in those village areas where surveillance indicated indigenous malaria or a significant malaria hazard. Special problems of refractory malarious situations would be given further study and urgent attention.

Viet-Nam would extend its attack through house-spraying, as far as possible, with particular attention to development of the epidemiological service. Investigations would be conducted in two centres to determine the most effective ways of stopping malaria transmission where Anopheles balabacensis and A. sundaicus were important vectors and under conditions of shifting populations.

Malaya remained the one member of the Board which had not embarked on a malaria eradication programme and now proposed to conduct, with the assistance of WHO, a pilot project of special interest. An area had been selected, extending from the coastal plain to the central mountain range, offering a transect containing all of the several known malaria vectors in the country, a representative cross-section of the population, and a situation of generally moderate malaria. This should test the efficacy of eradication procedures in eliminating residual malaria, rather than reduction of high malaria levels, under a variety of conditions.

All of the above plans in the member countries of the Board involved extensive training requirements. National training services would be supplemented by the special courses in malaria eradication techniques at malaria institutes and other suitable training centres abroad. The courses at the Malaria Institute of India and the Malaria Eradication Training Centre in Jamaica and the Philippines were of special interest. The last-named institution at Tala, near Manila, was arranging for courses to be conducted in the French language which would be specially useful to half of the member countries of the Board. New facilities would be completed at two centres in Thailand which would continue training the anti-malaria staff of Laos, as well as of Thailand, and would offer facilities to other countries.
B. Co-ordination of Malaria Programmes

The secretary of the Anti-malaria Co-ordination Board presented his report on the situation along international frontiers between member countries of the Board.

Five visits to border areas between member countries of the Board were completed during 1959, in accordance with the recommendations made by the delegates at the third Board meeting in Rangoon. The diaries of these visits and the collected information had been mimeographed in English and in French and distributed to all member countries of the Board in the form of "Circular Letters".

Special attention was given to three border sections:

(a) The eastern part of the border between Thailand and the Federation of Malaya. The population on both sides was a mixed Thai-Malaya population with numerous family and economic connections. The Thai side of the border had been sprayed with residual DDT once a year for three years.

It was agreed by the delegates from Thailand and the Federation of Malaya to undertake, early in 1960, entomological surveys to determine the vector in this border area.

The Federation of Malaya planned to carry out spraying operations on its side of this border area coinciding with the 1960 house-spraying campaign on the Thai side of the border.

(b) The Maesot district of Tak Province in Thailand, bordering the Amphef district in Burma, where spraying operations had been carried out since 1955. The available malariometric data indicate that the Maesot district offered unsolved epidemiological problems.

Investigations would be carried out in this district by the Thai malaria eradication project and the member countries of the Board would be informed of the results of these investigations as early as possible.

(c) The Pailin district in Cambodia bordering Thailand in the west. Three annual spraying operations had shown no influence on the degree of malaria endemicity in this area. It had been proved that A. balabacensis was the responsible vector in the Pailin district and that the practice of using farm huts (chamkar) facilitated the transmission by A. balabacensis.
The Pailin district would serve as the operational zone for the proposed trial of medicated salt distribution.

Plans were discussed for further border visits to be carried out in 1960. **Target dates concerning spraying operations in border areas**

**Burma** There were still certain areas on the border with Thailand where it was not possible to carry out spraying operations. It was intended to include as many of these areas as possible in the spraying programme of 1960.

**Cambodia** All border areas had been covered by spraying operations. The next spraying would be carried out from February to June 1960.

**Laos** It was hoped to carry out spraying operations in 1960 along the entire border with Thailand. Due to political disturbance it was doubtful if the border area with Cambodia could be included in the spraying operations of 1960.

**Malaya** Entomological surveys would be carried out early in 1960 in the eastern section of the border with Thailand. Malaya planned to carry out spraying operations in this area in 1960, coinciding with the spraying operations on the Thai side.

**Thailand** All areas bordering Laos and Cambodia were included in the Thai eradication programme. Some areas on the border with Burma which had not yet been covered by spraying operations would be included as soon as possible.

**Viet-Nam** In 1960 it was planned to cover all border areas by spraying operations.

C. Technical Discussions

1. Methods of measuring interruption of transmission

   To measure when transmission had been interrupted surveillance methods were necessary.

   The traditional spleen and parasite surveys, which only sample the population, were not delicate enough.
Surveillance involved the whole population at risk, with visits to all houses at regular intervals to find fever cases, take blood slides and give treatment. When a focus of infection was found it was investigated epidemiologically and appropriate measures were taken to stamp it out.

It was not generally practical to start surveillance until malaria had been reduced to a low level. Prior to that survey methods might be sufficient for evaluation.

It had been suggested that surveillance may be started when the spleen rate in children 2-9 years old had been reduced below 10 per cent, the parasite rate below 1 per cent, and the infant parasite rate was zero.

Laos, however, was establishing surveillance in the third year of spraying regardless of the parasite level. It was expected that an early institution of the surveillance process, including a more intensive use of drugs, would make possible the stopping of transmission sooner than could be done by spraying alone.

Thailand established surveillance in 1958 according to the recommended procedures, except that visits were not yet frequent enough. It was hoped to cover the whole country by 1960.

Burma also did surveillance in 1958, chiefly to train the staff in the procedures, and covered a population of 3.6 million. Over 70 per cent of this population was visited three times during the period June to November. Positive malaria cases were 0.14 per 1000.

2. Importance of Secondary Vectors

Anopheles balabacensis had been shown as important in Cambodia, Thailand and Viet-Nam and was present in all member countries. Detailed studies on the bionomics of this mosquito and its response to insecticide application were undertaken in Cambodia. Investigations on this mosquito were being carried out also in Thailand, Laos and Burma.

In the Snuol experimental area and certain other parts of Cambodia, where before spraying Anopheles minimus was the main vector, A. balabacensis had become of primary importance following the control of A. minimus.
During the dry season in Cambodia the breeding of *A. balabacensis* was mainly confined to the interior of heavy forest, while in the wet season the road tracks and hoof prints exposed to the sun also formed important breeding places.

*A. balabacensis* was an exophilic species (resting outdoors) and bit man readily indoors and outdoors at night. After feeding it might fly out immediately from farm huts and might rest only briefly in the village houses.

The LC$_{50}$ of DDT for the normal strain was about 0.7 - 0.9% and LC$_{100}$ was probably 4% or more.

Thorough investigations in the Snuol area showed failure to interrupt transmission of malaria in the *A. balabacensis* areas with DDT residual spraying. This was because the mosquitoes did not pick up a lethal dose of DDT before leaving the sprayed structures, due to the irritation of DDT, as well as their exophilic habit. The spraying of DDT had certainly decreased the numbers of the mosquito but not to the point of interrupting transmission, which required the use of drugs.

In the area of Thailand bordering Cambodia, *A. balabacensis* had also proved refractory to spraying and malaria transmission was not interrupted. Much the same had already been reported with *A. balabacensis* in North Borneo where it was the primary vector.

The problem of mild malaria due to secondary or minor vectors, which by their habits were not vulnerable to insecticides, was discussed in a paper from Malaya. This pointed out that intense malaria may be easier to eradicate than mild malaria, when the latter is carried by secondary vectors having relatively little contact with insecticides in houses.

This may lead to the formation of areas of refractory malaria within a country, which threatened reinfection of the primary vector areas from which malaria had been cleared away.

The members of the Board should be prepared for this situation and must expect that special studies would be necessary to find means of overcoming refractory malaria.

Pilot trials for future eradication campaigns should include attention to both secondary and primary vectors.
3. **Practical co-operation along international borders**

Effective co-operation required the exchange of information by neighbouring countries. At present the most useful method for such exchange was by border meetings, such as held by India and Burma. These meetings should be rather informal and then would be most valuable. More frequent and direct interchange of information was desirable where possible.

Specific border problems which could be mentioned were the amount and nature of border traffic. In hilly regions lines of communications generally were few and populations not very dense, but in densely populated flat land where the border was formed by a river such as the Mekong, there was usually a great deal of inter-country traffic. Another type of problem was sometimes encountered where people lived in villages on one side of a border, but had their farms on the other side.

4. **The part played by permanent anti-malaria works and anti-larval measures in malaria campaigns**

In Malaya, about two-thirds of the anti-malaria work was for the protection of town populations. Under Malayan conditions, anti-larval measures were more effective and more suitable for towns than anti-adult measures (house-spraying).

These anti-larval measures consisted of permanent and temporary works. Examples of permanent works were sub-soil drainage of ravines in hilly areas to prevent breeding of *A. maculatus*, or on the coast, dykes (bunds) and tide gates to keep out salt water and prevent breeding of *A. sundacius*. Temporary works were mainly earth drains which were sprayed with an anti-malarial oil once a week.

In addition to their essential functions of malaria prevention, many of these anti-larval measures also served to drain the land and make possible the control of nuisance mosquitoes.

5. **The cost of surveillance**

Thailand was rapidly progressing toward institution of surveillance in all operational areas, including those still being sprayed. It was not possible to separate strictly both phases of an eradication campaign because they are simultaneous in many parts of the country. In view of the scarcity of data on costs of surveillance everywhere, the figures from the Thailand Budget are tabulated as follows:
A. **Budget:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries and wages</td>
<td>504,420</td>
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<tr>
<td>Travel and allowances</td>
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</tr>
<tr>
<td>Vehicle operation and maintenance</td>
<td>80,640</td>
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<tr>
<td>Drugs</td>
<td>75,000</td>
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<tr>
<td>Insecticides</td>
<td>156,000</td>
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<tr>
<td>Other items</td>
<td>95,340</td>
</tr>
<tr>
<td><strong>Depreciation</strong></td>
<td>73,050</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>1,117,350</strong></td>
</tr>
</tbody>
</table>

B. Total for spraying operations 320,112
Total for surveillance 797,238

C. Cost per capita and year (US$)

- Spraying (once, in areas of 5,000,000 population) 0.06
- Surveillance (3-6 visits, in areas of 14,000,000 population) 0.06
- National population (23,600,000) 0.05
- Population protected (14,000,000) 0.08
- Individual contacts (63,000,000) 0.02

6. **Problems of shifting cultivation**

In Viet-Nam approximately 781,000 inhabitants belonging to mountain tribes were practising shifting cultivation in jungle areas. Though these people formed not more than 6 per cent of the population, they covered three-fifths of the total area of the country. The topography often made their dwellings nearly inaccessible and their traditional customs hampered co-operation in an anti-malaria campaign. Resettlement was planned and may improve both standards of living and potentialities for anti-malaria work.

This problem of shifting cultivation in forest areas was present to some degree in all the member countries of the Board, and was made more difficult because the vector in those areas was often *A. balabacensis* which was not
well controlled by residual insecticides. This combination of difficulties, due to the way of life of the people and the habits of A. balabacensis, constituted one of the most important technical problems facing member countries. It seemed to call for the use of drugs in some form, and medicated salt was under trial as one method of drug distribution.
Part III

RESOLUTIONS ADOPTED

1. The Board,

Recognizing that there are areas where, due to refractory vectors, thorough insecticide spraying alone does not interrupt transmission,

RECOMMENDS that in such areas there should be:

(1) prompt investigation to determine why transmission continues,

(2) application of additional measures to interrupt transmission, and

(3) precautions to prevent re-infection of adjacent areas.

2. The Board,

Noting with concern the failure to achieve interruption of transmission of malaria in some areas where *A. balabacensis* is the vector;

Considering that at the moment the most promising method of attack is the use of residual insecticide in combination with anti-malaria drugs;

Recognizing the importance of the research at present being implemented, especially the trial of medicated salt;

RECOMMENDS the extension of research aimed at this problem and urges member Governments to co-ordinate their attempts to find the required solutions.

3. The Board,

Re-emphasizing the importance of training at all levels in malaria eradication;

Noting that half of the member-countries of the Board use French as a second language;
Further noting with satisfaction the planning already being undertaken to organize malaria eradication training courses given in the French language; RECOMMENDS that such courses be organized and supported by all available sources as necessary.

4. The Board,

Noting the progress made toward co-ordination of anti-malaria operations along international frontiers;

Further noting the useful and informative reports from the Secretary on the situation in border areas;

Recognizing that efficient spraying with residual insecticide offers the most effective means of protection known in most frontier areas; RECOMMENDS that the member Governments give priority in their operational programmes to the carrying out of spraying operations in frontier areas.

5. The Board,

Noting with satisfaction the progress made toward the planning for the eradication of malaria;

Stressing the need to persevere with the maximum government support until eradication is achieved;

Further stressing the importance in malaria eradication of a well-organized malaria service, staffed by trained personnel with security of office adequate budgetary support, and administrative procedures suitable to the emergency requirements of malaria eradication programmes; RECOMMENDS that the member Governments review the organization of their malaria services in order to facilitate realistic planning for the eradication of malaria, to consolidate the gains already made, and to overcome the considerable difficulties still remaining.
Part IV

BUSINESS OF THE BOARD

Duty station of the Board secretary

The delegates discussed a suggestion to determine the definitive duty station of the Board secretary. The majority felt that Bangkok was more centrally situated than Saigon and would facilitate the visits of the Board secretary to the member countries of the Board. However, agreement was reached to defer this question until the next meeting.

Date and place of the next meeting

The delegate of the Royal Government of Laos kindly invited the Board to hold its fifth meeting sometime in December 1960 in Vientiane, Laos.
VOTE OF THANKS

The Board, for itself and others participating in the meeting, expresses its sincere gratitude and its deep appreciation to all those who have made possible the success of this pleasant and profitable meeting, particularly:

(1) to the Government of the Federation of Malaya for its hospitality and the facilities it has provided for the meeting;

(2) to the Honourable Dato Ong Yoke Lin, P.M.N., Minister of Health and Social Welfare of the Federation of Malaya, and Dr Mohamed Din bin Ahmad, Director of Medical Services, for their hospitality, facilities and courtesy;

(3) to the Governments of the Union of Burma, Cambodia, Laos, the Federation of Malaya, Thailand and Viet-Nam, for their co-operation in facilitating the participation of their representatives;

(4) to the delegates of the Royal Government of Laos for its kind invitation to hold the fifth meeting of the Board in Vientiane, Laos in 1960;

(5) to all the Governments and Agencies for sending observers;

(6) to the President and Fellows of the Society of Medical Officers of Health (Malaya Branch) and the participating staff members of the United States Operations Missions and WHO at the meeting for their hospitality;

(7) to the WHO staff interpreters for their services during the meeting;

(8) to the Chairman, Dr Mohamed Din bin Ahmad, Director of Medical Services, Federation of Malaya, and the Vice-Chairman, Dr Keo Phann, Director of the Anti-malaria Service, Cambodia.
INaugural Address

by

The Honourable Dato Ong Yoke Lin, P.M.N.,
Minister of Health and Social Welfare,
Federation of Malaya

It is indeed a great honour to the Federation of Malaya to stage this important meeting in Kuala Lumpur and it gives me great pleasure to welcome you all to our country. Though Kuala Lumpur cannot offer the architectural splendours of Angkor Wat, Bangkok or Rangoon which must have fascinated and delighted the eyes of the delegates of the first, second and third meetings of the Board, we sincerely hope that nonetheless you find your stay in our midst both enjoyable and interesting. I believe that my Ministry, in conjunction with the World Health Organization and the Anti-malaria Co-ordination Board, have mapped out an interesting programme for you.

This meeting, held at this juncture of our history, is of significant importance to us as we will be soon commencing a pilot scheme in malaria eradication early next year. We therefore hope to learn from your experience and improve our existing methods in combating this dreadful disease - malaria. We believe that this gathering of experts in this field of preventive medicine from Burma, Cambodia, Laos, Thailand and Viet-Nam, the World Health Organization and the United States Operations Missions would produce up-to-date knowledge and techniques which would be invaluable to us. It will be agreed that at such meetings where experiences, techniques and views are freely discussed that the best methods in overcoming mutual problems are evolved.

The wealth of a nation largely depends on the work of its people. Anything that interferes with that work damages the national wealth. Malaria has been a long standing disease not only in Malaya but throughout this part of the world. All will agree that this disease, being endemic in this region, has been the cause of sickness and loss of many valuable lives. It lowers the vitality and efficiency of a nation.
Annex I

Whilst the urban population of this country is protected from this disease through the vigilant measures instituted for its control, the same cannot be said in respect of the rural population. This Government is, however, cognisant of this fact and fully realizes its responsibilities. It has therefore adopted appropriate measures to deal with this situation. Steps have been taken to start the training of personnel required to combat malaria in the rural areas. We are going to make a careful trial eradication project in a sample area with the expert help of the World Health Organization. This trial is due to commence early next year.

You may feel that for a country which has been so long noted for its skill in malaria control, and sometimes boasts a little about it, that we have been rather slow over taking up eradication. We must plead preoccupation until recently with the fight against a greater menace - the Communist terrorists - which has cost the country many millions of dollars and the efforts of our best men. However, we have been closely watching your war against malaria in neighbouring countries with keen interest and admiration and quite frankly we hope to profit by what you have learnt the hard way, and to have the latest model in eradication when we shortly start.

I have now both the honour and pleasure in declaring this meeting open and I wish you success in your deliberations.
MESSAGE FROM DR. C. MANI, REGIONAL DIRECTOR, WHO REGIONAL OFFICE FOR SOUTH-EAST ASIA

I have great pleasure in extending to the participants of the fourth meeting of the Anti-malaria Co-ordination Board a warm welcome on behalf of the South-East Asia Region of the World Health Organization.

During your three earlier meetings you have already appreciated the importance and usefulness of these close contacts in improving the beneficial results of the programmes of malaria eradication in progress in the countries represented on this Board. Although it is well known that disease and disease vectors do not respect geographical boundaries, the implementation of this knowledge still needs our united counsel and co-ordinated action. Judging from the precise items that you have listed for discussion at the present meeting, I have no doubt that your present session will be as fruitful as the earlier meetings and prove the real value of fruitful collaboration with your neighbours.
MESSAGE FROM DR I. C. PANG, REGIONAL DIRECTOR, 
WHO REGIONAL OFFICE FOR THE WESTERN PACIFIC

On the occasion of the fourth meeting of the Anti-malaria Co-ordination Board I have great pleasure in sending you this message on behalf of the Western Pacific Regional Office of the World Health Organization.

During the past year steady progress has been made throughout the Western Pacific towards the achievement of malaria eradication. There have been setbacks and these setbacks have underlined the important fact that malaria eradication is possible but difficult.

As your anti-malaria campaigns progress, co-ordination of effort is more important than ever before.

In some of the Member-countries technical difficulties have been encountered which have so far defied solution. Every effort is being made to develop new methods of attack and to adapt the old ones to particularly difficult local circumstances.

Eradication must be based on a sound technical method which can guarantee the complete interruption of transmission of the disease; without interruption of transmission eradication is quite impossible. Equally important is a well planned organization to carry out this method. It is essential that governments give the fullest support to the eradication campaigns even if this involves heavy expenditure for a few years and a streamlining of civil service procedures. Men, money and materials must be welded into an organization that has the resources to achieve its objects and is flexible enough to meet the unforeseen difficulties that must be expected in any biological struggle.

The benefits of malaria eradication have already been emphasized many times; the advantages of eradication over control are now self-evident.

May I wish you an interesting and profitable meeting.
ADDRESS BY MR BRIAN JONES,
Chief of Field Operations and Programming Division,
UNICEF Asia Regional Office

WE NEED MORE HELP, ON TIME

When I received WHO's invitation to speak to this distinguished gathering of malaria experts at the opening ceremony today, my first thought was what could I, a layman, have to say that would have real meaning within the context of our work at this conference. My second thought was to see what I said to the Anti-malaria Co-ordination Board in Rangoon a year ago, and in Bangkok two years ago. On these occasions I talked about administrative and supply problems that we have to face in our battles against malaria. These problems have not all been overcome. On the contrary, some of them are even more pressing now than they were two years ago.

I should therefore like to suggest that attention should be directed to these administrative problems, in addition to technical problems, during our regular meetings this week. I should like to see our attention focussed on three questions, among the many that you will wish to consider.

Question number one. Has the budget request been met in full, and was it met on time?

Question number two. Has the project been provided with the full contingent of staff we said was necessary to fulfil the requirements for eradication?

Question number three. Has the project received in adequate measure the insecticides, the sprayers, the drugs, and the transport we decided were necessary for a successful campaign?

If the answer to any one of these questions is "No," the prospects for eradication of malaria are less than good. In short, let us determine whether the project has been given the measure of support required for success, remembering that we can't have successful health projects without adequate resources of men, materials and money. In no project is this more noticeable than in malaria eradication. In no other project, perhaps, is this fact of such paramount importance.
Annex IV

Malaria eradication projects must not be subjected to normal procedures for getting funds and staff. They require special procedures which will ensure that the money is released on time without fail, and that staff can be recruited in good time to be trained before they must assume their duties in the project. It is essential that a schedule for these actions be prepared, and that it be understood and agreed by the budget and finance people well in advance of the date campaign operations for each year are due to begin. Without such understanding and agreement, money and staff are unlikely to be provided in good time, and the project will not achieve the essential measure of success.

Our review during these few days will show whether we have reason to be satisfied with the achievements of recent years, or whether we must be dissatisfied. We shall, in making our review, remember the criterion that anything far short of 100 per cent success is tantamount to failure. This is particularly appropriate in considering two of our projects, in which we have reached what might be termed "the last mile." This last mile is likely to be the hardest, too.

Two years ago we stressed the fact that malaria eradication will demand the active co-operation and participation of many departments of a government, and of the people themselves. We noted that malaria can exact as heavy a toll of life and result in as much sickness as war itself, and that its subjection or rather its eradication will, like war, require the employment by governments of every necessary resource at their command. Today, two years later, we need to question whether national efforts have been as total as an all-out war against malaria demands. Have the efforts been too little, and too late? If they have been, can we define the reasons for this situation, and can we propose measures for bringing about the necessary degree of improvement? Perhaps we might add one more question for consideration: are these reasons technical, non-technical, a mixture of both, or are they just plain lack of understanding on the part of the authorities who control the money and men needed to do the job?
If there is this lack of understanding (and the evidence suggests that the lack exists), it follows that we who are aware of the dangers of delay in dealing with malaria must educate and inform the uninformed. How to correct this situation might be one of the dominant themes during our meetings this week. Let us make sure that every person connected with our projects, directly or indirectly, in and out of government, of high and low degree, is on our side. If these conditions obtain, victory is surely ours.

Thank you, ladies and gentlemen.
MESSAGE FROM UNITED STATES OPERATIONS MISSIONS
TO CAMBODIA, LAOS, THAILAND AND VIET-NAM

Mr. John E. Taylor,
Malaria Eradication Project Manager

Excellencies, Ladies and Gentlemen,

It is an honour and a pleasure to speak for the USOM engaged in anti-
malaria work in the countries comprising the South-East Asia and Western
Pacific Anti-malaria Co-ordination Board.

I think the most fitting remarks that I can make to express the interest
of USOMS in this endeavour, might be expressed in the words of President
Eisenhower in his state of the Union message January 9, 1958 to the Congress
of the United States which expresses his interest in the eradication of malaria
and I quote:

"We now have it within our power to eradicate from the face of
the earth that age-old scourge of mankind: malaria. We are embarking
with other nations in an all-out five year campaign to blot out this
curse forever."

To show that this was no idle statement on the part of the President
and the Congress, funds in the amount of US$61,000,000 have been appropriated
since 1958 for this multi-national undertaking.

The approach was twofold: first, direct financial support to the World
Health Organization Malaria Eradication Special Account and the Pan American
Health Organization to further work in 51 countries where they, in turn
support programmes; second, direct financial assistance to the countries
which have bilateral agreements with USOM. There are 25 such countries in-
volved in eradication programmes on a bilateral basis with the United States.
Of the 6 countries comprising the South-East Asia and Western Pacific Anti-
malaria Board - Burma, Cambodia, Laos, Malaya, Thailand and Viet-Nam four
have bilateral agreements with the United States. Total assistance provided
by American aid for anti-malaria work in Cambodia, Laos, Thailand and Viet-Nam
to date is US$13,200,000 including 10 American technicians.
I am citing these figures to show that the President and the Congress of the United States through the United States Operations Missions, are doing what the President said would be done by making available financial and technical aid for malaria eradication projects.

The United States will continue to give financial and technical assistance to eradication programmes within the limits of its ability.

The carrying out of the objectives of the Anti-malaria Board to coordinate eradication activities within the six countries is of fundamental importance. We all realize that to eradicate malaria within the boundaries of a country without establishing safeguards to protect it from reintroduction from without, could make our efforts less effective. We all have the mutual problems and responsibilities of developing proper measures for prevention of transmission from one country where malaria transmission has not been interrupted to another where surveillance is in progress.

Another valuable contribution of the Anti-malaria Board is the exchange of ideas for improving methods of survey, operations, drug administration surveillance and other problems of eradication. Examples of such problems common to all of us are those of reaching remote villages with their scattered field huts, seeing that they are properly and regularly sprayed, and assuring that surveillance and drug administration are properly handled. These problems if not properly solved, can mean the difference between success or failure in the overall programme.

We, the USOM Representatives, feel privileged to attend this meeting as part of an international health team which must work out the best means to achieve malaria eradication. I wish to assure the Board and the countries represented of the continuing interest and support of the United States in this endeavour.