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SRI LANKA

THIRD ANNUAL EVALUATION

OF THE

ANTI-MALARIA CAMPAIGN

(AMC)

MAY 25TH - JUNE 13TH

1961

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L I S T O F C O N T E N T S

I. INTRODUCTION

1.1 Anti-Malaria Campaign :

The Anti-Malaria Campaign is a specialised Campaign which functions under the Deputy Director of Public Health Services and Director of Health Services. The Central Organization consists of a Superintendent, Deputy Superintendent and four Medical Officers in-charge of Training, Epidemiology, Logistics and Laboratories, Spraying and Transport. There are two Entomologists in-charge of the entomological activities. There is an Establishment, Finance and Assessment Branch at the central level together with a Central Laboratory and a Motor Repair and Workshop. The Headquarters is sited at Narahenpita. A separate Cross-checking Laboratory and Training Centre function at Deans Road, Maradana. At the Intermediate level there are 16 Regional Offices at Jaffna, Vavuniya, Anuradhapura, Puttalam, Maho, Kurunegala, Matale, Kandy, Badulla, Moneragala, Amparai, Batticaloa, Hingurakgoda, Trincomalee, Embilipitiya and Matara. These are usually manned by Regional Medical Officers, Senior Sanitarians and their staff. There are 17 Sub-regional Offices manned by Sanitarians under the regional offices and at the periphery there are 42 Public Health Inspectors' Vigilance Units which supervise the spraying activities, surveillance, and treatment activities carried out. Altogether there are over 4,000 employees attached to the Campaign.

1.2 Background of the Review :

The Intensive Malaria Control Programme commenced on August 15th, 1977. This programme was based on the Plan of operations signed by the Government of Sri Lanka and W.H.O. on 6th May, 1977. The participating bilateral agencies are US AID., United Kingdom and the Netherlands. According to the Plan of Operations and the loan agreement signed between US AID and the Government of Sri Lanka the AMC programme is to be evaluated annually by an Independent Assessment Team.

This is the third Evaluation. It is a crucial assessment, as 1982 marks the end of the Intensified Control Programme. A new control programme will have to be drawn up for 1982 - 1986.

The present status of the malaria situation has to be assessed. The degree of success of the present programme and how far the objectives the programme have been met has also to be reviewed. The Operational, Administrative and Technical aspects of the Programme have to be carefully checked and pragmatic solutions found to any defects noted within the financial constraints to which the programme is subject to.

The broad outlines of the new revised programme will include -

(1) A stratification of the malarious area.

(2) A rationalisation and limiting of spraying according to the stratification and transmission potential.

(3) The appropriate use of supplementary and integrated methods of control.

(4) The personal administration of drugs, augmented by volunteers and personnel of the General Health Services; and

(5) The intensification of training and research.

These aspects will be carefully reviewed as to its applicability and feasibility to the anti-malaria activities in Sri Lanka.

1.3 The Terms of Reference for the 3rd Evaluation is as follows :

1. To review the implementation of recommendations made by the Second Annual Review Team, in February/March, 1980, and to identify constraints responsible for incomplete implementation, if any.

2. To review the progress of the Programme during 1980 and the present status of the malaria situation in the country and its relationship to the planned programme phasing under approved Plan of Operations.

3. To review the nature and extent of operational problems affecting the Programme as well as the administrative, financial, environmental and staffing constraints affecting the management of the Anti-Malaria Campaign.

4. To provide an epidemiological review of the malarious areas and its surveillance system in order to determine the nature, extent and periodicity of the anti-malaria measures required to maintain a degree of control of malaria as planned. This would require the selection of :-

(i) areas where permanent protection with insecticide is required.
(ii) areas where seasonal spraying should be sufficient.
(iii) areas where focal spraying can be used.
(iv) areas where complementary or special measure of attack could be applied.

5. To review the progress and present status of the research activities being carried out in the Programme;

6. To review the programme of Village self-help, and other activities of Community Participation in the Anti-Malaria Campaign;

7. To review the present training needs of different categories of personnel in the AMC and the type of training required;

8. To review the participation of the Health Services in the surveillance and other anti-malaria activities;

The participants include :-

01. Dr. A.V.K.V.de Silva (Team Leader) - Chief Epidemiologist, Ministry of Health.

02. Dr. David Mair (Rapporteur) - Entomology Advisor, WHO Headquarters, Geneva.

03. Professor George Davidson - U.K. Consultant -O.D.H.

04. Dr. S.Pattanayak - W.H.O. Consultant and Director M.M.E.P. Govt. of India.

05.	Dr. Suwan Wongsarojana	- W.H.O.Consultant & Deputy Director General CDC Bangkok, Thailand.
06.	Mr. Larry Cowper	- Regional Malaria Advisor for Asia, US AID.
07.	Mr. Ray Matheny	- Malaria Consultant - US AID
08.	Dr. K.M.Rashid	- W.H.O. Regional Malaria Advisor, SEARO Delhi.
09.	Mr. P.K.C.Kumaradasan	- Deputy Director, Budget.
10.	Mr. A.T.P.L.Abeykoon	- Assistant Director, Ministry of Plan Implementation.
11.	Mr. B.H.Passaperuma	- Asst.Director, External Resources.
12.	Dr.(Mrs.) K.A.K.K.Wijewardena	- Lecturer, Public Health Faculty of Medicine, Colombo Campus.

Methodology of the Review :

The Team was briefed by the Superintendent and senior staff of the A.M.C. on 25th May, 1981. The present status of the malaria situation and the control programmes was explained to the participants. All aspects of the Programme were covered including the operational, administrative and financial constraints. Four teams were nominated for field trips to the various malarious areas of the Island. These teams include foreign participants, national participants, AMC Medical Officers and Entomologist and the local W.H.O. staff attached to the Campaign.

The field trips commenced on 27.5.1981 and ended on 3.6.1981.

The Teams visited the various regional offices and sub-regional offices to check the operations, administration, entomological activities and epidemiological status.

From the 4th to the 11th the entire group met to summarise their field trips and prepare the complete report in keeping with the terms of reference. They also reviewed the working of the Central Office, Central Malathion Stores, Training Centre, Research Projects, the Central and Cross-checking Laboratories.

The final report was presented to the Hon. Minister of Health on 11th June, 1981 at 9.00 A.M.

II. Review of the actions taken on the recommendations of the Second Annual Review Team - February/March, 1980.

1. Malaria Epidemiology & Control
Establishment of AMC Headquarters Resources Unit.

This Unit was formed by June, 1980. However, it consists of only one Medical Officer (Spraying), Entomologist and the Epidemiologist. In 1981, the A.M.C. requested an additional parasitologist and Entomologist for Headquarters. Although the positions were supported and recommended by the Ministry of Health they were turned down by the Treasury. Approval has again been sought from the Treasury.

(A) TECHNICAL

A.M.C. Entomologists have commenced work this year on the identification of possible secondary vectors. The monitoring of the susceptibility status of vectors has been intensified. The AMC could not obtain HCH as there were no funds provided for procurement of this commodity.

(B) OPERATIONAL

(a) Epidemiology of Persistant transmission:

Stratification of the malarious areas has been initiated in preparation for the Assessment. Lists of positive villages have also been prepared from records of the activated medical institutions. However, these lists are as yet incomplete. The aim is now to demarcate areas for -

(1) Continuous spraying throughout the year.
(2) Two rounds of spraying in May/June and October/November.
(3) Seasonal spraying.
(4) Focal spraying.

(b) Improvement of measures in chena and gemming areas :

(1) The establishment of sub-depots of insecticide and spray pumps in a number of central settlements in gemming areas and chenas would be difficult as these places need security and have to be guarded (Watchers).

(2) The completion of spraying cycles before these areas become inaccessible (floods, etc.) and the transport of Units and equipment to such areas, say by bullock cart, are receiving the attention of the Anti-Malaria Campaign. However, the General Government budget cuts in 1981 has made this aspect difficult.

(3) The A.M.C. agrees that the payment of extra hardship allowance to sprayers who need to be in the field for very long periods would lead to a more efficient operation. However, these additional allowances would have to be approved by the Ministry and the Treasury, as such, allowances are outside of the normal financial procedures.

(4) The provision of mass radical drug treatment to groups before the rainy season starts has been considered but not implemented to-date.

(5) The extension of voluntary treatment centres in these areas has been carried out in a number of Regions.

(c) Measures in Development Projects:

Sharing of the cost of Anti-Malaria Operation in development scheme is a policy matter to be discussed by the Ministry of Health with the Mahaweli Development Board or any other irrigation authority. The provision of stores and temporary accommodation for A.M.C. personnel is of Paramount importance. This has been brought up at the Health Council of the Mahaweli Board, but much more inter-sectorial cooperation needs to be obtained.

(d) Improved Geographical Reconnaissance (GR):

The S/AMC has given instructions to the Regional Offices and Sub-Regional Offices (SRO) to carry out the G.R. The FAA of walking units were instructed to draw up sketch maps and number the houses. However, due to a lack of paint this operation has been hindered. The Departmental Tender Board has only recently given the authority for the procurement of the paint.

(e) Use of emergency spray squads:

Till the vacancies for Field Assistants are filled the S/AMC is unable to establish any emergency spray squads.

(f) Protection of spraymen from Malathion toxicity:

Renewed in-service training has been carried out in all Regions for personnel handling malathion. However, the quality of locally produced gloves and bags available cannot be improved.

(g) Cholinesterase testing:

All New MMOO have been trained in Chlinesterase testing. In 1980, 4,579 tests were carried out as against 2,534 in 1979. There were 55 personnel reported as being between 50% to 61.5% and 14 between 49% to 37.5%. These workers were temporarily removed from spraying duties and were only sent back when their cholinesterase levels went above 75%. Table 14 of the Administration Report 1980 gives details on the test schedule. There were 8 MMOO posts vacant which limited testing.

(h) Identification of all blood film sources :

Action has already been taken to identify all blood film sources in R.O.and S.R.O. The R.M.OO. and OO.I.C., S.R.O. have been instructed by circular and inspecting officers from National Headquarters to pay more attention to the relevant forms and to visit and advise institutions more frequently.

(i) Improvement of surveillance measures :

Until the vacancies of FAA are filled this cannot be carried out.

Contd.....

(j) Motivation of Passive Case Detection (PCD)

Though instructed by the Health Directorate, the PCD institutions have not responded to a satisfactory level of blood slide collection in many areas.

(k) Reporting of Fever Incidence :

The differentiation into Actual and Recent fever cases in activated medical institutions was found to be impractical.

(l) Epidemiological Investigation of cases :

Epidemiological investigation of P. falciparum cases has already been instituted. The P. falciparum investigations during 1980 were more complete than in 1979.

(m) Inter-Regional meetings :

The method of implementation of Inter-Regional meetings was taken up with the RM00 at the RM00 Conference held at Headquarters on 12th March, 1980. However, a large number of RMO positions remain vacant.

(n) G 6 PD - deficiency :

Sigma Kits were received from WHO and tests were carried out in three villages of the Medawachchiya and Anuradhapura Districts. About 11% of 250 tested appear to suffer from gross deficiency.

2. ENTOMOLOGY :

(a). Distribution of Entomological Teams & RMO use of Entomological Teams :

The programmes have been revised to attempt to accommodate the recommendations of the 1980 Assessment Team.

(b). Monitoring of malathion susceptibility :

Sampling techniques are being modified to increase sample size. Tests on malathion and alternative insecticides are attempted in all localities visited for both special studies and spot checks.

(c). Study of Anopheline Fauna :

Arrangements have already been initiated to study the distribution of Anopheline fauna in the country. However, due to limited staff, priority has been given to areas with rapid environmental changes, such as development schemes (sites selected are Maduru Oya, Victoria Dam Site and Mahaweli "H" area), gemming area(selected site Elahera) and Chena cultivation (areas to be selected in Mullaitivu area). For further reference see Section 5.

(d). Trend observations of Anophelines :

3 localities (Madhu Road in Mannar Health Area, Mangala Oya in Amparai Health area and Thanamalwila in Moneragala Health Area) have been selected for monitoring.

(e). Establishment of Insectaries :

Establishment of a temporary insectary at the City Microbiological Unit, Maligakanda, Colombo Municipality has been completed. Plans have been drawn up for a standardised permanent uncontaminated insectory for the AMC work will start this year on this construction.

Mobile field laboratory facilities are being made available.

(f). Promotion of other mosquito control measures :

Future entomological participation in supplementary control measures will be restricted initially to study the efficacy of the methods already undertaken. In addition, these evaluations are to be coordinated with epidemiological functions and related to effective case detection.

3. LABORATORIES :

(a). Transit of blood slides :

Posting of slides is the only pragmatic method available. Lossess could be eliminated by registration, but the cost would be exorbitant.

(b). Cross-checking :

15% Positives are now being examined and 10% of the negatives are being examined on a purely random basis.

(c). Distribution of Regional Laboratories :

New Regional laboratories are planned to be opened at Puttalam, Trincomalee, Moneragala and Amparai.

(d). Officer-in-charge :

The AMC is carrying out various projects, such as the Choline Esterase estimations, drug resistance tests, enzymn deficiency tests and Sero-epidemiology and M.L.T.T. services are essential.

(e) Microscopist strength:

95 vacancies r ained and those vacancies are only now bein filled. The delay is due to the fact that the microscopists have been categorized into the middle lev -el technical grade.

(f) Staining procedure:

The staining proceduros are now generally good. pH meters have be n supplied and spoilt buffer tablets have been removed.

4. Training:

(a) Training at MC Training Centre:

The Assistant Director, Health Education together with the M.O.I.C. Training Centre and Health Education of the MC have carried out a number of programmes in 1980 to improve the efficiency of the MC personnel.

(b) Training of R.H.O.O. in Microscopy:

Action has been taken to train new R.H.O.O. in microscopy at the Central Laboratory rather than at the Training Centre.

(c) Training of Field Assistants (FA):

Training of Field Assistants is carried out in all regions during the inter-cycle periods. Due to constraints in the cadre, it is not possible to set up additional units. When the vacancies in the F.A. cadre are filled, mop-up teams may be established.

(d) Training of Sprayers:

Action will be taken to set up practice areas in all Regions where a sprayer could be trained on all aspects of spraying procedures. This training will be carried out during the Inter-cycle periods.

(e) Training in data handling:

When additional staff is obtained for the MC, training in data handling and assessment will be carried out.

(f) Strengthening of Professional Teaching & Research Resources:

Recruitment for vacancies in the Universities is a matter yet to be taken up with the Ministry of Higher Education and the University concerned by the Ministry of Health.

5. Research:

(a) Anopheline fauna of new development areas, gem pits & chena cultivation areas:

Arrangements have been initiated to study the distribution of anopheline fauna in Sri Lanka with emphasis on the above ecological situations.

(b) Vectorial Competence:

This will be undertaken after preliminary investigations on the bionomics of the suspected species have been completed and also after familiarisation of staff with the technique of mass sporozoite concentration.

(c) Replacement Insecticides:

Preliminary investigations have been initiated.

(d) Relapse pattern of P. vivax:

This study commenced in October, 1980 in Tissamaharama area involving the population of seven villages.

(e) Radical treatment of P. vivax:

Trials on radical treatment of P. vivax have not commenced yet.

(f) Monthly drug prophylaxis:

This recommendation has not been implemented. To carry out all recommended research projects would require a large increase in the ANC technical staff.

(g) A study of the river flow patterns as a warning system of malaria epidemic outbreaks:

This project, which commenced in December, 1980, is a study of the water flow height of 8 rivers namely Kala Oya, Mee Oya, Deduru Oya, Attanagalu Oya, Maha Oya, Kuda Oya, Kirindi Oya and Menik Ganga.

Epidemiological data is collected from the Medical Institutions on the Bank of the rivers in the study areas together with fortnightly larval surveys within 100 yards of the gauging station. Ten sites on either bank of the river are surveyed at five dips per site. The larva collected are examined by the Entomological Section, ANC.

The maximum gauge reading is obtained from the particular gauge station manned by personnel of the Hydrology section of the Irrigation Department.

(h) Field Trial with Actellic:

A small scale field trial to assess the impact of organophosphorous insecticide (Actellic) 25% w.d.p. on malaria transmission is in progress in Tonigala - Puttalam Health Area, using Entomological and malariometric criteria. Three cycles of spray operations have been completed and the fourth is scheduled to commence of 27th March, 1981. Data at present being analysed.

(i) Field Trial with Bendiocarb:

A field trial using experimental huts is in progress at Hailaweva, in Hambantota Health area in collaboration with Fisons Ltd. to assess the impact of the carbamate insecticide (Bendiocarb) on the malaria vector A. culicifacies The first and second cycles of spray operations have been completed.

(j) Chena cultivation areas:

This has not been possible to implement so far.

(k) Sporozoite detection:

Gradual progress is being made towards implementation of this technique.

(l) Refusal rates:

Services of a sociologist have not been available.

6. Supplies:

(a) Stores of malathion at Central & Regional Offices:

The new central warehouse at Anuradha has come up to roof level and is expected to be completed in 3 months time. The present warehouse accommodation at Aturugiriya and Kaduwela is considered satisfactory.

(b) Stacking of Malathion:

All Regions have been notified that boxes are now to be stacked on their ends.

(c) Testing of malathion stocks:

There are now no supplies of malathion in the ANC programme over 15 months from the date of production. All

reports on quality control and ISO-malathion content of malathion imported into the country were available.

(d) Empty malathion containers:

Circular instructions have already been given to R. 00. and S.R.00 to burn empty malachion boxes and plastic bags away from human habitation.

7. Transport:

(a) Vehicles:

Delays in setting up the required Boards for condemning vehicles has occurred due to lack of action on the part of the Ministry of Health Transport Section. The Campaign should be given the powers to elect its own Board to expedite the condemning of all unserviceable vehicles and disposing of them.

The appointment of drivers, tinkers and mechanics to fill the vacancies have been repeatedly brought to the notice of the Ministry as the Ministry is the appointing agency. Several letters have been addressed to the Ministry by the Campaign to make two-thirds of the cadre of drivers permanent. At present, two-thirds of the drivers are casual, with a rapid turn-over, resulting in accidents and damage to the fleet of new vehicles and a chronic shortage of drivers.

Delay in [illegible] petrol bills still occurs.

(b) New vehicles needs:

Additional lorries have been obtained and are now operating in the programme.

(c) Garaging and repair:

With the clearance of the malathion stocks from the Head-quarters warehouses, the buildings for the Central Workshop can be extended. Work benches and adequate storage for tools and spray parts are planned to be provided when this expansion is complete. In-service tranining of mechanics could be provided, if the Ministry makes arrangements for an instructor from either the Central Workshop or from outside who can come to the Campaign and give lectures and training on a short-term basis.

The ban on local vehicle repairs applies only for the new Land Rovers which do not need any major local repairs. Mobile workshops have been set up and are operating to attend to repairs of these vehicles and servicing.

8. Equipment:

(a) Nozzle tips have been ordered to meet US AID specifications. There had been a considerable delay in placing the orders. The hose pipes supplied locally have been defective.

(b) When all the vacancies for the Store-keepers at the Stores Branch are filled and when adequate stores and stationery requirements are obtained, the time-lag between the reconciliation at receipt of supplies should be reduced.

9. Community Participation & Health Education:

(a) Voluntary Treatment Centres:

Action had already been taken to set up voluntary Treatment Centres in Development areas, etc. Regular visits are paid by R.M.O. and P.H.I. V.U.U. to ensure drug Prophylaxid and Blood filaria. This scheme has been extended to pilgrim areas.

(b) Participation by School Children:

The assistance of children in the senior grades to help in the detection and treatment of malaria cases had already been introduced, in the highly endemic areas. Teachers are also enlisted in this scheme. Motivation is carried out by regular visits paid by M.O., (T.&H.E.) and P.H.II. to these schools.

(c) Village self-help Health schemes: Key to con problem in AMC

Action has been taken in collaboration with the Health Education Bureau.

(d) Health Education in problem communities:

Special problems such as house spray refusals, etc., have been taken up (in conjunction with the Health Education Bureau) by the recruitment of volunteers from village leaders Heads of Religious Denominations, School Teachers, etc., in areas where such problems are repeatedly encountered. This scheme has been put into operation in the North, Central and Eastern Provinces and will be extended to other areas as well.

10. Administration:

A. Improved Conditions of Service:

(a) Improved inducements to R.M.O.. The AMC finds that it is difficult to get Medical Officers to man the regional offices. Incentives for Medical Officers are much higher in the hospital services. The Ministry of Health had recommended that R.M.O. be replaced by Scientists qualified in Parasitology or Entomology. These recommendations are now with the Treasury.

(B) Office of the S/AMC:

Several evaluation teams since 1971 have made strong recommendations to attach a civil list administrative officer to the AMC. The Superintendent is unable to deal with appointments of staff, transfers, checking of office performance, administrative aspects of logistics, etc.,

(c) Emoluments:

The evaluation Team recommended that to attract medical Officers and Scientists to the Campaign, their salaries or emoluments should be increased in order that they are commensurate with the financial rewards of Physicians on the clinical side. This does not appear to have been considered so far.

B. General Administration Matters:

(a) RMO's visits to Institutions:

Instructions have been given to R.M.O. both by circular and by briefing during recent conferences to inspect institutions regularly to check blood-filming, malaria case detection, fever and total attendance recording.

(b) Delayed correspondence:

Channels are being streamlined at AMC Headquarters. All Sections have been requested to note all correspondence arriving at their respective sections with immediate disposal action to the sectional clerk. However, there is a rapid turn-over of clerks at AMC Headquarters and presently there are are about 7 - 8 vacancies.

(c) R.M.O. & S.R.O. furnishings:

The Headquarters quota for furniture, stationery and other supplies is limited and supplies to the regions are also reduced. For quicker delivery, additional staff should be given to the Central Stores Section and two additional Store-keepers are required immediately.

(d) Powers of R.M.O.:

It was also recommended by both evaluation teams that the powers of the Regional Medical Officers be enhanced to include disciplinary powers over Field Assistants. At present, delays do occur as papers have to be processed for action in Colombo.

(e) Staffing of AMC Headquarters:

The immediate need to fill vacancies which exist for an Accountant, additional Store-keepers (2), Stenographer (1) and Steno-typist have been strongly recommended. However, these vacancies are not being filled.

(f) Staffing at R.M.O. level:

At present Field Assistants carry out clerical and store-keeping duties at the Regional level, although they are not trained to so so. The recommendation to attach one senior clerk to each Regional office is, therefore, quite in order, but has not been implemented.

10. C. Public Support for the A.M.C.:

(a) Political Will:

It would be useful if international agencies organise -d a seminar to brief politicians on the workings and activities of the Anti-Malaria Campaign. Although the Hon'ble Minister of Health has taken up the matter of malaria generation by illicit gemming with the Hon'ble Minister of Finance, no solution has been achieved. This type of problem can be solved only at the highest echelons of authority.

(b) Community participation:

The AMC will, if approved, join with Sarvodaya and Oxfam to carry out large scale village trials in Anuradhapura and Moneragala Regions in reducing mosquito breeding sources and improving all field activities of the A.M.C. with the peoples' cooperation and improved efforts of the AMC workers.

dig holes - results in stagnant pools of water where mosquitos breed

sounds good

III. REVIEW OF PROGRESS AND PRESENT STATUS :

3.1. GENERAL EPIDEMIOLOGICAL REVIEW :

3.1.1 General epidemiological situation.

1980 was the 3rd year of the Intensive Malaria Control Programme launched in late 1977, under which malathion spray has been the main activity of malaria control by quarterly application of 2gm/m^2.

The general declining trend of the malaria incidence in the whole country observed during the first two years of the programme seems to be stationary during 1979 and in 1980 as shown by the figures of Annual Parasite Incidence(API)per thousand population and the total cases of malaria recorded:

Year	API	Total cases of malaria
1977	18.7	262,460
1978	4.9	69,685
1979	3.3	48,004
1980	3.3	47,949

P.vivax continues to be the prevalent species and its reduction follows the general pattern of the incidence although the P.falciparum and mixed infections after 1977 have not suffered significant variation as is shown below:

Year	Total Positives	P.Vivax	P.falciparum	Mixed infections
1977	262,460	251,726	10,431	303
1978	69,685	67,809	1,826	50
1979	48,004	46,636	1,313	55
1980	47,949	46,476	1,421	52

Case detection system was planned in 1977 with the Passive Case Detection - PCD - as main activity in both the spraying and non-spraying areas during the first 2 years of the programme. All the 597 Medical Institutions - MI - in the country should carry out PCD and anti-malaria drug administration, blood filming all fever cases in the areas with high malaria risk.

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The MI in these malarious areas of high risk as well as those MI in the epidemic belt should all be activated - APCD - by deployment of one Field Assistant - FA - of the AMC to carry out the blood filming.

In the non malarious areas only the suspected and clinically diagnosed cases should be blood filmed.

Active case detection - ACD - should be undertaken in highly malarious areas where PCD facilities are not sufficient, as well as in areas where early detection of residual and/or new - foci is necessary in order to take prompt remedial measures.

Different factors as (i) lack of effective participa ion of the MI in the PC , (ii) lack of staff in AMC for "activation" of MI (230 MI act--vated out of 597) and for establishing the ACD in the areas where it is necessary and (iii) changes in the criteria for blood film collection from age groups and fever history of the patients attending the OPD in the MI, have made the case detection system variable, both in time and in space, during the four years under review. As a result the Annual Blood Examination Rate - ABER - ap ears to be insufficient for the whole country and in certain health areas, while it seems to be excessive for the required level in other health areas. These two extreme situations make difficult to assess whether the blood sample collected is represen--tative of the population under risk in order to assess the realistic picture of malarious incidence in the country. The results of the blood film collection from all the sources in the period are shown below:-

Year	Total Blood films collected	ABER
1977	954,756	6.8
1978	968,327	6.8
1979	1,001,217	6.9
1980	803,692	5.5

3.1.2. Epidemiological review by Zones :

The three geographical zones in which Sri Lanka is divided according to the annual average of rainfall have marked influence in the level of malaria incidence and the malariogenic potential of the areas as well as in their response to the anti-malaria control activities.

The general epidemiological situation described in 3.1.1. show some variations when studied zone by zone.

The Wet Zone with annual rain fall average ranging from 40 to 200", corresponds to the south-western part of the Island and the central hills where the non malarious areas and areas with low endemicity are located (see map annexed). In this zone 21 Health Areas with a population approximately of 4,131,000 inhabitants reported 2,552 cases of malaria during 1980, equivalent to an API of 0.6‰. Cases were not epidemiologically investigated but there is an impression that many of them could be considered as imported, since most of the non-malarious area is located in this geographical zone. Details can be observed in Table "A" showing also the situation of those areas during 1977.

Although these areas of unstable malaria are vulnerable and receptive and the risk of outbreaks of malaria exist, improvement of the case detection and promptness in applying remedial measures when and where necessary, could allow them to be maintained without spray cover.

The Intermediate Zone has an average of rainfall ranging from 20 to 40 inches per year, this zone surrounds the wet zone and marks its division from the dry zone (see map annexed). The intermediate zone comprises 37 health areas with an approximate population of 4,619,000 inhabitants and corresponds to the epidemic area of malaria. During 1980 in this zone there were reported 12,722 cases of malaria which represent an API of 2.8 for the whole zone, but the range of variation is very wide among the different health areas : 18 health areas had an API less than 2.0‰, 13 health areas are with an API between 2.1 and 5.0‰, 4 health area with an API between 5.1 and 10.0‰ and 4 health areas in which the API was between 10.1 and 14.0‰. Details are presented in table "B" the estimation of endemicity is subjected to the limitation of case detection already described in 3.1.1.

In some of these health areas the feasibility of lessening the periodicity of spraying or even withdrawing it in other areas should be considered whenever case detection is improved and resources for application of remedial measures, when necessary, are provided.

The Dry Zone has an average of annual rainfall below 20 inches and corresponds to most of the territory of the country in the North - Central part, east and South - East part of the Island. There are 35 health areas with an approximate population of 4,020,000 inhabitants and this zone contains the highly malarious area of the country. During 1980 were reported 34,528 cases of malaria equivalent to 72.0% of the total number of cases. The average of the API was 8.6%. But 14 health areas had annual incidence above this average. Details are presented in Table "C". The ABER is above 10% in 20 health areas, the same which , in general, are the highest endemic areas at present.

Improvement of the malaria situation from 1979 to 1980 is observed in some of those health areas whilst in others it has deteriorated. It is in this dry zone where the most important national development programmes are ongoing in addition to intensive activities of "gemming" and "chena cultivation" in remote areas, where there is the impression that the spraying operations are not reching the standard, periodicity and coverage required for controlling the malaria transmission.

Administrative and operational problems described in this report should be tackled as a condition for faster and more effective response to the control activities in a wider area.

Changes in spraying coverage and periodicity could be considered in selected localities of the health areas which are in a better epidemiological situation.

The progress of the AMC during 1980 and present status of the malaria situation in the country, as a result of the combination and additive effect of staffing constraints, administrative and financial limitations affecting the field operations and the management of the AMC does not correspond to the programme phasing planned under the present Plan of Operations.

The new malaria control programme for the next period 1982 - 1986 should be drawn up under more realistic feasibilities according to the resources available and on the basis of the degree of progress achieved in the period under review.

Epidemiological details are provided in Annex 1 and 2.

3.2 Entomological Services :

3.2.1 Introduction :

In malaria control programme the fivebasic functions of entomological services are :-

(a) Provision and up-dating of basic information for planning purposes.

(b) Monitoring of operational impact

(c) Participation in epidemiological investigation of "problem" areas.

(d) Conducting field applied research to guide the programme and maintain flexibility.

(e) Training.

On examination of the entomological activities during 1980 it can be seen that the majority of the above items were in fact attempted and covered as far as possible considering the various serious constraints which were operating during the year.

3.2.2 Staffing :

The entomological staff of the A.M.C. available for carrying out all aspects of work during this period consisted of one entomological assistant (supervisory grade), 10 Entomological Assistants (E.AA), 8 Field Assistants (F.AA) and 42 Labourers, distributed among 12 teams. Work was carried out under the technical guidance of one National and one WHO Entomologist. Of the 12 teams 2 were stationed at Headquarters and 10 assigned to 10 out of the 16 Regional Offices. Entomological service was also made available to those regional offices not assigned a team. For better supervision and closer collaboration, the teams earlier stationed away from regional offices were re-stationed at the respective regional offices.

Teams are presently stationed at Jaffna, Trincomalee, Anuradhapura, Tonigala, Batticaloa, Badulla, Kurunegala, Hingurakgoda, Mailagama (2) and Colombo (2).

3.2.3 Training :

To improve the quality of work performance field orientated refresher training was given to E.AA. A new identification key, an improvement of the currently utilised key by Carter, was introduced to facilitate study on distribution of anopheline fauna in the country.

3.2.4 Outline of Activities :

In general the programme was based on observations either related to control measures already in operation or guidance for future vector control strategies.

These observations consisted of -

(a) Trend observations involving fortnightly monitoring in a limited number (7) of pre-selected localities which included 2 areas in development projects, in a chena cultivation area and in a gem-mining area.

(b) Spot checks in localities reporting malaria incidence and based specifically on requests made by the Regional Medical Officer concerned.

(c) Testing of susceptibility to insecticides.

(d) Bio-assay of deposits on sprayed surfaces.

(e) Monitoring of supplementary control measures, such as -

(i) Larviciding with abate.

(ii) Space spray operations with pyrethrum.

(iii) Source reduction using intermittent flushing.

All the latter, however, have very limited application as yet.

(f) Field applied research, such as, insecticide trials. (Please see under Section V.)

Sampling Methods used in these observations included :-

hand collections indoors and outdoors,
human bait catches indoors and outdoors,
window-trap catches,
pyrethrum spray catches,
cattle-baited traps and
larval surveys.

It is found that cattle-baited traps yield the highest number of A.culicifacies and their use is being extended where large samples are required, e.g. for susceptibility testing.

The above observations have yielded a mass of basic data during the year, and this is in process of being analysed and summarised.

In general, it appears that properly conducted malathion spray operations produced a good impact on the vector A. culicifacies. Where substantial numbers of vectors were encountered this appeared invariably due to poor operational standards. This was true in both trend observations and spot checks.

The establishment of a central insectary is in process in Colombo.

3.2.5 Susceptibility Testing :

Tests were carried out on A.culicifacies throughout the year, and in many different parts of the operational area.

In brief, these tests indicate the continued susceptibility of A.culicifacies to the operational insecticide, malathion. As part of the general policy of screening, small numbers of mosquitoes were used in some tests, however, in general, the number tested was of a sufficiently large size.

Besides malathion, A.culicifacies was also tested against -

DDT
dieldrin
fenthion
fenitrothion
propoxur
decamethrin
permethrin

Resistance continues to be shown to DDT. The situation regarding permethrin is doubtful and should be investigated further since only 77% mortality was obtained on the diagnostic exposure. This possibly indicates some cross-resistance with DDT.

The vector was indicated as susceptible to all the other insecticides tested however.

Other anopheline species tested included -

A. annularis
A. subpictus
A. varuna
A. vagus
A. barbirostris
A. hyrcanus

The level of susceptibility vis a vis malathion appears satisfactory in all these species with the possible exceptions of A. barbirostris and A. hyrcanus. The latter especially appears to have a general broad-spectrum background resistance to all insecticide groups tested. It would be interesting to discover if there is any identifiable pattern [illegible] to the use of agrochemicals (for example, is A.hyrcanus particulary associated with rice?).

3.2.6 General Remarks :

The Review Team was impressed by the amount of work carried out by the entomological services during the period under report, despite the numerous serious constraints which have been effecting the programme generally.

The mass of useful data obtained should be summarised and utilised in the planning of the New Malaria Control Programme which is now proposed for the period 1982 - 1986.

In view of this impending re-organisation, and taking into consideration the numerous difficulties and constraints encountered by the AMC and its component parts in recent years, and observed by the Team in the field, it is felt that the entomological services should now be consolidated in order to achieve maximum efficiency and economy.

It is, therefore, suggested that 8 mobile units be retained, under direct supervision of AMC Headquarters. Staff would also be utilised in the insectary, entomology laboratory and in data recording, analysis and presentation.

It is envisaged that this would have the following advantages :-

(a) Increased efficiency in team working due to closer logistic support and supervision.

(b) Greater opportunity for training and improvement of standards.

(c) Improved over-all team morale and

(d) Obvious economy in transport, fuel and supplies.

Such an installation, backed by appropriate laboratory and insectary facilities could also, at some future date, serve as the basis for a general Vector Control Section, should the Government decide on the desirability of such.

Such a re-organisation of entomological services as suggested above should, of course, only take place after the detailed epidemiological stratification of the country now proposed.

3.3 Spraying Operations : Accomplishments and Status

Introduction:

During the regular 1980 spray rounds (10th, 11th, 12th & 13th) an average of 953,591 houses were found. Of these 61.8% were fully sprayed, 24.0% partially sprayed and 14.1% unsprayed because they were closed or the occupants refused to allow spraying. This activity involved 540 spraying units using a total of 4,372,646 lbs. of malathion 50% WDP or an average of 1,093,161 lbs. per round. The population protected during the regular spraying rounds averaged 3,376,655.

Additonally during 1980 focal and seasonal spraying accounted for approximately 23,000 more houses, protecting a population of roughly 83,000. This activity involved about 28,5000 lbs. of malathion.

See Annexes 3 and 4.

Assessment Team Activities:

The four sections of the Review Team inspected the work of 25 spraying units in 13 Regions visited during the period 26th May - 3rd June, 1981. This involved 18 M.O.H.areas. The teams were impressed with operational difficulties encountered by the field workers in carrying out the AMC spraying programme. They unanimously agree that spraying is not an easy task.

Generally, the spraying units checked were all on schedule as planned, implemeting the 16th round of spray, with the interval between the last spraying being approximately 3 months.

In conducting inspections of spraying units and houses sprayed the assessment teams used a standard form so that there was uniformity of items considered (Annex 3 and 4).

While there was a variation in the quality of spraying by the units inspected by the four teams, the following depicts the major observations:-

- coverage averaged 60 - 70% for houses checked
- sprayer discharge rates varied from 720cc to 1700cc/minute
- most sprayers checked discharged excessively
- locally purchased replacement hoses are reportedly inferior and often leak or burst under pressure
- many 10 year old sprayers require replacement straps (some are now crudely bound by wire)
- worn nozzle tips accounted for large droplets with a consequent wastage of malathion
- repeatedly the Review Team was informed of the lack of supplies (hoses, buckets, spare-parts)
- field checks of malathion weights were verified at 2 lbs.
- quantities of malathion used by the spray team and on hand were correct.
- Some mixers lacked gloves for mixing malathion and used wooden paddles instead.
- mixers complained that gloves were too large and wear out or tear easily
- protective clothing is not worn by all sprayers and not all who wear long sleeve shirts are fully protected because they roll up their sleeves: most wore shorts & not long trosers.

- all but one Region reported normal cholinesterase levels for spraying tested
- one team reported that cholinesterase tests for some spraymen occurred up to six months ago (the remainder, within the past 3 months)
- one sprayman was hospitalized for suspected malathion poisoning though this was not confirmed.
- soap for washing purposes was not present with all spray units
- areas which often were not sprayed were kitchen and other storage sites for seed rice plus rooms with sleeping infants or ill persons
- most refusals are due to the belief that the insecticide no longer kills flies and bedbugs and to the offensive odour of malathion
- in certain community areas, house are locked on the day of the announced spraying.
- house cards are usually accurately completed after spraying, though previously issued cards are frequently lost.
- moplacement house card were not always carried by F.A.'s
- one spray unit was being directed by a senior sprayman since the F.A. had not reported for work for 3 days.
- no spray units were found quitting before completing assigned work though one mobile unit eluded (perhaps unintentionally) one assessment team in the early afternoon
- some spray units had only 3 out of 5 men working (absenteeism being highest among seasonal personnel)

SUMMARY :

The team recognizes that some of the recommendations made by the 1980 evaluation team relative to spraying operations have been implemented while others, because of constraints, have not been able to be carried out.

The team emphasizes the following :-

(1). Spraying training is urgently needed in many units to reduce malathion wastage by improving techniques in timing, distance and overlap. Even experienced spraymen should receive periodic refresher courses.

(2). While the safety procedures in the handling and use of malathion has greatly improved over the last year, continued attention to this aspect is required to avoid organophosphorous poisioning, which endangers life and hempers future AMC activities. The Team realizes the difficulties experienced in procurement and distribution of protective clothing to field units. However it is suggested that priority be given to purchasing, distributing and using needed protective clothing. In the interim, spraying personnel should be routinely directed to wash exposed body portions freely with soap and water several times during the day.

(3). While Team members did not report seeing used malathion cartons being sold or used by the public, they did see cartons used for several purposes (including ceilings, walls for an out building, storage for records, etc.). A follow up memo should be sent to RMO's regarding the requirement for safe disposal of used cartons by burning away from occupied residences.

(4). The Team notes an ample stock of sprayer spare parts, haver-sacks and other supplies at Headquarters but a shortage of these items, in the field. Field Assistants in-charge of spray units frequently complained of the lack of spare parts. Efforts should be taken by the AMC supply section at offices to fill supply requests promptly. Minimum stock levels should be maintained at all Regional sites.

(5). As recommended previously, RMO's with border problems should periodically meet since some areas are more accessible to one Region than another. (as the area between Batticaloa and Amparai).

6) The Team concurs that populations in chena, gemming and developing areas are importa. . to incorporate into AMC activities and strongly urges that geographical reconnaissance be implemented and maintained in these areas. This would ensure more effective spray coverage and case detection and treatment efforts.

7) Spray pump discharge rates generally need to be reduced through the tim ely replacement of worn nozzle tips and/or defective pressure valves.

8) Team members agree that Field Assistants directing spraying units would greatly benefit in training on supervisory techniques. (Some were observed giving little or no istruction to sprayman regarding inferior work habits)

9) To facilitate meeting AMC goals and objectives, the team recommends immediate recruitment and training to fill Field Assistant vacancies.

3.4 Laboratory status and progress :

The system of collection of blood smears in 1980 remained much the same as in the previous year except that in the case of indicator institutions blood filming was restricted to those below the age of 10 years and fever cases. In the Activated Passive Case Detection (APCD) centres only fever cases were examined.

The four teams carrying out the Third Annual Evaluation visited 7 Regional laboratories. All except that at Jaffna showed staff shortage though this was not having much adverse effect as the present work load is not over high. In fact the average number of slides examined per microscopist per day was only of the order of 40 with a variation between 27 and 65 in the 7 laboratories. Thus the existing laboratories can cope even with additional mass surveys. Some of this fall in work load is attributable to the woeful lack of contribution of blood films from pure PCD institutions and a shortage of APCD and ACD agents. With the present work load the urgency for more laboratories and more microscopists would appear to be lessened though this should not stop new recruitment and training. Increased pressure on the service will undoubtedly occur in the future and is in fact planned for.

No major back-logs were detected in any of the laboratories visited and examination times varied from 1 - 4 days once the slides were received. The time-lag between blood filming and receipt of the slide at the laboratory varied considerably with delays of two to four weeks not uncommon. The main reasons appear to be delay in despatch and postal delays.

The general working conditions in the laboratories and the microscopes were usually satisfactory except in the case of Jaffna where a complete staff complement of 19 seemed overcrowded in the space provided at the Old Chest Clinic, having been recently transferred there from the Base Hospital. Most laboratories rely on daylight as a light source for microscopy but have a source of electric supply in addition, though this is seldom required.

In common, in all the laboratories visited there were some deficiencies in correct staining requirements especially in supplies of distilled water and buffering reagents to ensure a correct water pH. Examples of both too acid and too alkaline staining were seen. These most important deficiencies could lead to misdiagonsis and need rectification.

15% of positive and 10% of negative slides are routinely cross-checked. All P.falciparum positives are checked. Cross-checking performances for the year 1980 were -

Total negatives examined	....	169,377
Total errors	....	371
% error	....	0.2%
Total positives examined	....	13,350
Total errors ..	....	49
% error ..	....	0.4%

3.5 Management, Administration, Logistics & Transport Organization.

3.5.1 Management & Administration:

The general description of the Anti-Malaria Campaign (AMC) has been provided in the Introduction portion of this report. The teams made special efforts in their evaluation to determine the quality and quantity of the administrative aspects due to their importance and influence in carrying out the field program.

3.5.1.1 Personnel:

In the organization of approximately 4,700 employees there is continual movement in and out of the program, promotions, transfers, disciplinary action, complaints and all the various other implications of such a large organization. The year of 1980 can be characterized from a personnel point of view as a year of disappointment in recruiting required staff to carry out the vital epidemiological surveillance activities and laboratory services. During the year there was also a serious shortage of drivers, which hindered the work of the operations and entomology personnel in carrying out their technical and supervisory duties and assignments. The impact of the personnel situation took a heavy toll on the progress expected of AMC during the year. On the other hand, spray operations while hindered by shortages of personnel, did for the most part complete their work assignments within the general time expected by using a large number of seasonal labourers. The over-all situation is that of the 4,777 sanctioned cadre for the AMC, there were functional at AMC at the end of 1980 only 3,734 personnel. The major shortfall in personnel was in the Field Assistant category with approximately 600 sanctioned positions not active. All four evaluation teams made comment on this shortfall of Field Assistants as it affects the collection of epidemiological data upon which the program operations are planned and carried out. The reported block in the successful recruitment of these Field Assistants lies in the administrative procedures to recruit such AMC personnel through a Government organized Job Bank whose procedure are slow and, it would appear, complex. The shortage of drivers is a government-wide problem as many drivers have taken positions with firms in the Middle East. However, it is believed that establishment of a permanent category of drivers in the AMC instead of the many casual positions which now exist would help the situation. It should be noted that a large number of man-days were lost to the program due to the lack of drivers. A strike of clerical staff in mid 1980 also slowed administrative processing of AMC documents to and from the field, as well as internally and to the Ministry of Health. This clerical situation improved towards the end of 1980. The most serious personnel shortage in programme management is in the lack of Regional Malaria Officers (RMO) in the 16 Regions. Approximately 50% of these positions are vacant and being filled by Acting Officers of various levels of competency. If the field programmes are to operate on a successful basis, there must be qualified leadership. Agreement has been reached to recruit science graduates to fill these positions in lieu of medical officers, but to date such replacement has not taken place. The Evaluation Report of 1980 made mention of this lack of RMOs and the reason for the lack of qualified people to fill these posts. Most of the matters of personnel described in this report are beyond the control of the Superintendent and effective action lies elsewhere in the Government. The S/AMC has repeatedly brought these problems to the attention of concerned officers at higher levels of the Government, but response to his needs have been slow. It would seem logical to the Team that more control and recruitment responsibilities could be assigned directly to the Superintendent for such positions of Field Assistants and drivers to expedite the programme. In the past, repeated recommendations have been made for a senior administrative officer to be assigned to the Central AMC Office, but to date no action has been taken to provide this officer. The S/AMC requires this assistance and the Government is again urged to assign this Officer.

3.5.1.2 Finance :

The financial position of the AMC appeared to be adequate in 1980 judging from the documents provided. The 1980 AMC approved budget was Rs. 81,763,100 and this sum was allotted to the program. The 1980 AMC expenditure was Rs. 81,481,350 or 98.4% of the funds provided. The AMC budget (Annexes 4 & 5) represented 9.38% of the Health Ministry budget for 1980. When one considers that only 3.75% of the total National budget is provided for the Ministry of Health financial needs, the amount provided to the AMC can be said to be very supportive. This AMC budget presentation includes foreign assistance which in 1980 represents approximately 55% of the total allocation to the AMC. The main external donors in 1980 were the USAID (51%), British Government (1.4%), Netherlands Government (1.9%) and the World Health Organization in the foreign assistance portion of the AMC budget allotment. The major portion of the foreign assistance was for procurement of Malathion, spray equipment and construction of central and regional warehouses.

The Teams reported in all Regions that there had been no serious delays in the salary payments to staff during 1980. In addition, travel claims for permanent staff were also met without delay but there was general complaint that travel allowances for casual staff were often delayed for months. Investigation by the Review Team proved that the reports were accurate as some casual travel claims were months in arrears. There also was general complaint that fuel and servicing bills sent to Colombo were not paid in time and that private operators furnishing fuel had on occasion cut-off supplies and services to the AMC. In one Region it took approximately five months to process a claim even though the bill was submitted in time to AMC/Hd. Qrs. The Team is under the general impression that delays in fuel payments come about in many cases at both ends of the process - Regional as well as Central. It often took more than a week for the Regions to submit bills for payment and this time delay can be improved. In general, the financial situation for the AMC was acceptable for the operating programme and the majority of the defects noted in the field reviews are matters for internal correction and responsiveness.

3.5.1.3 Transport & Workshop :

At the beginning of 1980 there were 354 vehicles in the AMC program of which 195 are in use in the operational activities. A total of 69 unserviceable vehicles were sold at public auction in October 1980, There were 16 accidents reported to AMC vehicles during the year of which 3 accidents were considered major. The workshop carried out a total of 86 major repairs and 626 minor repairs in 1980. The AMC operates a mobile repair team whose duties are to respond to regional requests for repair and servicing.

Each of the four sections of the Team reviewed the transport situation in the Regions and, in general, considered the transport situation satisfactory as far as the number of vehicles assigned. Most of the Regions reported no transport problem with the exception of Mahilipitiya and Sub-Region Tirukovil where replacement vehicles were reported as being required. Many of the AMC vehicles are old (some 10-15 years of service) and it was surprising that more complaints were not heard. There appears to be some problems with the landrovers as a number of breakdowns due to gear box and differentials problems were seen by the Team. The Region allotments for local vehicle repairs of Rs. 100/- was considered inadequate everywhere and a limit of Rs. 500/- was considered more appropriate. The fuel allotments are also hindering planned supervision and operations, but this problem is government-wide due to fuel costs.

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It appeared that with the wide availability of public transport some effort could be made to utilize these services. The AMC staff both in the field and at central headquarters must be realistic as to the Government's ability to supply vehicle support and learn to adapt their working efforts to existing conditions. One SRO told a Team that "why should he walk ? The Government must supply transport for him to work". Leadership like this will not solve the field problems now or in the future. The mobile repair team appears to be functioning well although several regions felt that more visits per year would be useful to them.

The central transport workshop is composed of 43 personnel including mechanics, drivers, office staff, labourers and other staff. The repair facility at AMC is hampered by a lack of two Grade I mechanics and one machinist as these skills are in wide demand in a developing economy and by companies outside of Sri Lanka. Government wage scales for vehicle mechanics are not realistic in the labour market and it is difficult for AMC to recruit and retain trained, dedicated mechanics and technicians. The shop requires repair of the electrical re-winding machine and a circular saw in the carpenter shop. Work benches are required to avoid working on the floor where dust may enter the parts. The work force needs an area for hanging their clothes, eating facilities. Perhaps part of the old warehouse can be [illegible]. The whole shop needs to be cleaned and repainted.

3.5.1.4 Logistics & Supplies :

The area of logistics and supplies is an extremely complicated area of administration and requires skilled officers and specialists. The Team considered that the AMC Supply Section is under-staffed, lacked training and is over-worked for the responsibility they have. The Team found that it was in this area of management that most complaints were heard at the Regions. Supply and logistics management is often reflected as a secondary task or a part-time arrangement which is absolutely incorrect. The Teams as a whole consider that AMC must give greater support, supervision, personnel, training and evaluation to their supply system and management.

The major commodity used in the AMC programme is malathion. All Teams reported that malathion was in adequate supply and available to the programme during 1980. With only two exceptions, the teams reported that all Regional/Sub-Regional malathion storage arrangements were satisfactory in the programme. A field visit was also made to the Central AMC Stores at Kaduwela and Aturugiriya and these stores were found satisfactory, secure and clean. This warehouse situation is a vast improvement over the reports of 1979. The new Central store being constructed in the area should further improve the situation. Another improvement in the malathion situation found by the Teams was that all insecticide being used in the programme had a production date of less than a year ago. Last year, the Teams reported some old insecticide stocks, but this defect has been corrected. Insecticide orders for 1981 have been processed and there are adequate supplies of malathion for the next 9 - 10 months either in-country or in the pipe line in spite of the serious fire which occurred in early 1980 which resulted in the loss of 500,000 lbs. of malathion.

The supply of anti-malaria drugs to the program in 1980 was also found satisfactory and there seemed to be adequate stocks available. The outlook for 1981 also appeared satisfactory for supplies of anti-malaria drugs.

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The spary equipment situation is, unfortunately, not as satisfactory as the insecticide and the Team heard complaint after complaint on the lack of sprayer parts, delays in supplying quality pump hoses and proper nozzles, soap, spraying forms and haversacks/plastic bags, protective clothing, and, in general, lack of supply support and materials in this area of activity. As the spraying operation is one of two major field activities of the AMC it would appear that more attention should be given to supply support. Again, most of the corrections can be made internally, as procedure exist to improve the situation. The Review Team can only encourage the Government to carry out the required bureaucratic procedures in a manner such as to obtain a smooth and effective supply system. The Team found other shortages of supplies including glass slides which seems inexcusable as without slides the MPOD posts cannot operate. This shortage was short-lived but was clearly a result of a combination of laziness, improper supervision, supply delays and a poor sense of dedication to carry out the work.

The records of the various Regions for supply control and inventory were reviewed by the Team. There were often errors or deletions in the balances but the system established by the AMC is adequate. The team believes that all stores should undergo at least annual verification, and that senior officers should make regular inspections of the supply-system and note their inspections on the records. It was reported that approximately 50% of the AMC stores had an annual verification in 1980. It was the Team's general view that supply and warehousing was in need of more organization, proper racks for storing items and more training for the persons concerned with the stores.

3.5.1.5 Supervision :

The Teams made a concerted effort during their review to determine not only the amount of supervision being carried out, but to note the quality of that supervision. At each Region and Sub-regional Office the number of days devoted to inspections/ supervision were noted for each officer and checks made made against the number of supervisory visits planned in the advanced program and the number actually carried out. As could be expected, there were large variations in both in quality and quantity of individual work. It was possible under this review to determine very quickly the "weak links" in the supervisory team. If a team of outside specialists can determine these faults in a rapid manner, it appears that it can also be done by national supervisory officers. When defects are found or when good work is done it should be noted. Often the inspections were very superficial and consisted of signing a name and date on the record even though the man being supervised was found by the Team to be making errors in record-keeping, the records were not up to date or technical errors noted. Effective supervision includes education, training, responsiveness to the supervised employee, efforts to avoid problems and documentation. Field Assistants in the spraying operations are more often only record-keepers of sprayed houses. Their primary task is supervision of the team to obtain quality work. Much more effort at all levels is needed in this area of supervision.

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IV. Review of the surveillance system and future programme direction

In considering this topic the Review Team took into account the objectives of the Intensive Malaria Control Programme which were set out in the Plan of Operations signed by the Govt. of Sri Lanka and WHO on 6th May, 1977. These objectives were :-

(a) Drastic reduction and subsequent elimination of P.falciparum.

(b) Drastic reduction of P.vivax transmission.

On comparing these objectives with achievements so far it is indicated by the available data that :-

(a) There has been a reduction of 87% in Pf transmission from 1977 up to the end of 1980.

(b) There has been an overall reduction of 81.5% in Pv transmission over the same period.

Thus while the above figures, taken over the whole 4 year period, and indicating marked control of the epidemic conditions of 1977, may be regarded with a certain amount of satisfaction, it must also be observed that most of the reduction occurred during the first two years. The situation from 1979 to 1980 appeared to reach a plateau, and little improvement appeared to be made in the situation in these two years. In fact, in some districts the situation deteriorated from 1979 to 1980 and even continued in an adverse trend into 1981.

This apparent deterioration in certain districts combined with the overall apparent levelling off of operational impact over the whole country, indicates a fairly unsatisfactory epidemiological situation and is a source of marked concern for the Review Team which regards it in the frame of the serious constraints in administrative, logistic and operational aspects under which the programme was labouring.

Apart from the difficulties in maintaining adequate spray coverage, the case detection system was identified as causing most problems, principally due to shortages of personnel for APCD and low output of slides from PCD institutions.

As regards APCD the Review Team heard with satisfaction that although up to now the shortage of F.AA had been the limiting factor, 50 new F.AA. were being recruited, and would be ready by July 1981. This meant that all 40 vacancies would then be filled, and in addition about 460 F.AA would be available for further expansion of the case detection and treatment system. The aim is to activate 600 institutions by 1982.

With regard to PCD it was recognised that the basic problem here is the shortage of medical and paramedical personnel which has even caused the closure of some dispensaries. It is proposed to continue and to intensify the motivation of the personnel involved through conferences, seminars, etc., for re-orientation.

One of the biggest problems in the present programme is the administration of the 5 days radical treatment. The involvement of Primary Health Care services such as, Range Midwives and Volunteers is strongly indicated.

As regards the supervision and stimulation of the case detection mechanism, the status of the Regional Medical Officers vis-a-vis the local Superintendents of Health Services has been causing some concern, however with the possible proposed re-organisation of the Ministry of Health which is at present being considered by the Government, this handicap is likely to disappear allowing closer collaboration. At present, the RMO is supposed to visit the SHS every week to brief him on the progress of the malaria programme, but often this is not possible.

The S/ANC proposes to back up the above projected improvements in case detection and treatment by the establishment of 4 new Regional Laboratories at Amparai, Moneragala, Trincomalee and Puttalam.

At present there are 95 vacancies for microscopists in the programme, but the ANC has recently received permission to recruit, so this situation should now improve.

As regards programme planning for the 1982 - 1986 period, the Review Team agrees with the general approach laid down in the document entitled "A preliminary outline towards drawing up a new malaria control programme for the period 1982 - 1986" which is attached as ANNEX 7 . This describes possible programme development within the framework of current financial constraints. Such an approach must be based on detailed epidemiological stratification. Marshalling of the necessary data for this is already under way and should now proceed at an accelerated pace.

The Review Team, at the present time in view of the lack of the necessary data, can only emphasise the following conditions as essential for stratification and possible withdrawal of insecticide coverage in a particular area :-

(a) The situation should be reliably clarified epidemiologically, taking into account previous malaria experience in the area.

(b) The case detection system should be strengthened to facilitate close monitoring.

(c) Emergency reserve operational units should be quickly available if required for epidemic control purposes.

V. Review of progress and present status of the research activities being carried out by the A.M.C.

The National Advisory Committee on Malaria Research continues to meet regularly at A.M.C. Headquarters where research activities pertaining to malaria control operations are discussed with representatives of other Government Departments, Corporations and Universities. The following research projects are being carried out at present :-

5.1 Indirect Fluorescent Antibody Test (IFAT) Studies :

Studies commenced in August, 1980 in Killinochchi Health Area (Killinochchi sub-region) in the northern part of the Island. Results so far have shown that one cross-sectional survey of 2,000 specimens yielded the same results as the examination of 1.5 million blood films. It also revealed that the malathion spray programme is effective. 1978 and 1979 surveys were also examined and confirmed the fall in malaria incidence observed parasitologically.

5.2 P.falciparum chloroquine resistance test :

The micro in-vitro method of monitoring for chloroquine resistance has been used since April, 1980 in Killinochchi, Kahatagasdigiliya and Dambulla sub-regions in the North and North Central Provinces, in Puttalam area in the Western Province and in Tanamalwila in the Mahailipitiya region in the south of the Island. All tests revealed that P.falciparum is still sensitive to chloroquine and even more sensitive to amodiaquine.

5.3 G. 6 P.D. deficiency :

This trait has been found to exist in certain pockets of population in the Medawachchiya and Anuradhapura Districts of the North Central Province.

Some 10% seem to suffer from gross deficiency and it is thought that treatment of such people with primaquine could lead to intravascular haemolysis (I.V.H.). However, the figure of 10% is now thought to be too high being derived from a heavily biased sample tested with the Sigma 400 kit. It is now proposed to carry out a more extensive survey and to show that primaquine at its normal therapeutic dose level does not cause I.V.H. even in the G.6 P.D. deficient individual.

(Contd. p.)

5.4 A Study of the relapsing pattern of P.vivax :

90 P.vivax cases from the Tissamaharama area of M.O.H. Hambantota have been followed up after being given treatment with chloroquine without primaquine. Chloroquine was given on days 1 (6 tablets), 2 (2 tabs.) and day 3 (2 tabs.) after diagnosis, and then further blood examinations made on day 4 and at monthly intervals thereafter. 82 of the cases have been followed since October, 1980. 19 re-occurrences of parasites have been noted and 15 are tentatively considered to be genuine relapses. Distinction between true relapse and re-infection is being made by monitoring changes in IGG and IGM levels in the blood. It is intended to follow two further sets of patients, one receiving both chloroquine and primaquine and the other receiving only primaquine.

5.5 Biological Control :

Aplocheilus dayi an indigenous fish known to eat A.culicifacies larvae has been the subject of a collaborative study between the ANC Entomologist, Mr.U.Wickremasinghe and Professor M.W.Costa of the Department of Zoology, University of Kelaniya. A field trial is being carried out in the Attanagalu-Oya in an epidemic area in the South Western foothills. An area of river 100 ft. long and 40 ft. wide has been sealed off with fish-netting and into it 3,060 fish released. Larval sampling data taken before and after release and from control areas of water without fish are being accumulated and the data are very encouraging.

5.6 Actellic field trial :

A small-scale field trial to assess the impact of house-spraying with the organophosphate insecticide pirimiphos-methyl (Actellic) on malaria transmission is in progress in Tonigala in the Buttalam Health Area. A 25% wettable powder is being used, applied at dosages of 2 g/m2 of active ingredient every 3 months, 4 spray rounds having been completed. The total area has about 1,000 houses and an adjacent comparison area sprayed with malathion has been demarcated. Both entomological and parasitological observations are being carried out.

The parasitological data have been difficult to interpret because parasite rates are very low and there is considerable movement of population throughout the area. During most of the period of the trial A.culicifacies have also been rare and reliance has had to be largely made on the results of bioassay tests with other species. Results from 3 experimental huts sprayed with 1 and 2 g/m2 of Actellic and 2 g/m2 of Malathion covering periods up to 72 days after treatment show that Actellic was slightly superior to Malathion in most instances when sprayed at 2 g/m2 and competed well even at 1 g/m2 (Annex - 8).

(Contd... page)

5.7 Bendiocarb experimental hut trial :

A field trial using experimental huts is in progress at Mailagama in the Hambantota Health Area to assess the impact of the carbamate insecticide, Bendiocarb (Ficam) on the malaria vector A.culicifacies. It is being carried out in collaboration with Fisons Ltd. the manufacturers of the insecticide. Eight verandah-type experimental huts are being used, 2 treated with Bendiocarb at 0.4 g/m2 and 2 at 0.8 g/m2, 2 at 2.0 g/m2 of Malathion and 2 untreated. Routine catches involve those from the window and verandah traps and those collected dead on the floor. Routine tests include delayed mortality counts of those caught alive, bioassay tests (on mud and thatch surfaces) and an aerial test involving the suspension of wild-caught A. culicifacies in cylindrical wire cages suspended one foot from 2 of the walls and the roof for a six-hour period. The huts were normally cow-baited but as naturally-entering mosquitoes were few in number, A.culicifacies caught in a cow-baited structure some 5 miles away were periodically released into the huts marking them with a fluorescent yellow dust. They could be recognised after recapture by the use of a UV-lamp.

Results so far indicate that both dosages of Bendiocarb and the dosage of Malathion produce similar effects upto 2½ months after application but that the higher dosage of Bendiocarb is superior after this time and was still giving a high kill on the thatch surface 5½ months after treatment.

VI. Review of the Programme of Village Self-help and other Community Participation in the Anti-Malaria Campaign (AMC)

There is a growing realization throughout the world that community participation in village-oriented health efforts are not only useful in carrying out the programme but, in the long term, essential. The Government of any country can not meet all of the health needs of its citizens, and if more is to be accomplished with the limited resources the public must be a part of the effort and contribute to its operation.

The anti-malaria work in Sri Lanka during 1980 was considerably assisted by a variety of community and self-help efforts. All members of the Review Team saw instances where drug distribution and treatment is being carried out by village citizens with the supervision and supply assistance of the AMC.

In some instances, members of the National Youth Scheme were providing health education and assistance with the spray operations.

The Sarvodaya movement has been especially helpful in the distribution of drugs in many areas of the country.

Irrigation and Agriculture project areas have taken up the treatment of malaria through the Rural Development Secretary/ President or by individuals such as teachers and priests distributing anti-malarials.

It was not common practice to collect blood films from fever patients at these centres, but the Review Team suggests that this may eventually be done in order to help in the assessment of the malaria problem.

In one area, these individual treatment centres were reported as treating approximately 50 people per month, which for that particular sub-region works out at 500 - 600 people who are being provided this service.

Some Regions, such as Jaffna had not used the community to any great extent in the distribution of anti-malarial drugs. It appears that where Regional Officers are interested such community assistance can be developed.

One of the traditional areas of malaria concern is the gemming industry. It was reported that a volunteer treatment centre at Okkampitiya near a gemming area had treated almost 100 persons in January 1981 and was averaging 3 - 4 requests for assistance per day. A similar treatment centre was organised in Elahera, Matale Region, with good results.

During 1980 a proposal was prepared for a co-operative effort between OX-FAM AMERICA, SARVODAYA and the AMC in carrying out a malaria control programme using village participation. This three year proposal envisions two pilot areas - ANURADHAPURA and MONERAGALA-which will carry out various malaria control activities including reduction of mosquito sources. Careful assessment will be made of the results of these efforts in order to determine if the scheme can be usefully expanded. This proposal has now been finalized, and it is hoped to start work by September, 1981.

Another porposal which has been developed by the AMC to ensure that anti-malaria drugs are widely available is now being studied. According to this proposal anti-malaria drugs could be packaged and sold at a subsidized cost to the public through the private sector such as stores, general shops, food centres, etc. While there are a number of benefits to such a system of providing clinical relief to malaria patients there are also some drawbacks such as the increased danger of having primaquine in a house where children may swallow the tablets without realizing the danger. The Review Team felt that the first step in the consideration of such a proposal is to obtain Ministry of Health clearances and agreement to support such a scheme. This agreement will rely to some extent on a sound cost estimate including the costs of the packages and distribution costs. If agreed, such a scheme could be tried in a selected area.

One of the most outstanding success stories in community participation in malaria control is in ANURADHAPURA Region where over 300 such volunteers are enlisted to assist the effort. The H-SYSTEM area of the Mahaweli Development Scheme has been well organised and is making a considerable effort to provide clinical relief. Some of the volunteer centres are now also taking blood slides in addition to drug distribution. Some of the volunteers also assisted in the mass blood surveys carried out by the AMC in the area in December 1980. The MAHAWILLACHALIYA Irrigation Scheme alone has 10 treatment centres. School children in advanced classes not only distribute drugs but also assist at the health institutions.

The possibilities of expanding the contribution of community participation in malaria control appear to be almost limitless in Sri Lanka. The concept of self-help is well established within the cultural, social and political framework of the country.

If these resources can be properly organized, motivated, trained, supervised, supplied and encouraged they will make a substantial contribution to the national malaria control effort.

VII. TRAINING :

During the year under review a number of training programmes in malaria were conducted, both at the National Malaria Eradication Training Centre (METC) in Colombo, in various regions of the AMC and in other institutions. At the METC the various categories of AMC staff as well as other public health workers reviewing training in 1980 were as follows :-

CATEGORY :	Duration of course :	Participants:	No.of courses :
Regional Medical Officers (AMC)	1 month	5	1
Public Health Inspectors	3 weeks	5	2
Malaria Supervisors	3 weeks	51	2
Entomological Assistants	7 days	12	1
Field Assistants	2 days	588	10
Medical Officers (Community Medicine)	1 day	7	1
Medical Officers of Health	4 days	6	2
Registered Medical Practitioners & Assistant Medical Practitioners	2 days	13	1
Medical Officers from the curative side	2 days	15	1
Pupil Midwives	1 day	23	1

In addition 7 postgraduate Medical Officers from the Liverpool School of Tropical Medicine underwent an orientation programme in Malariology as part of their curriculum leading to the degree of M.Sc. in Community Health. Also 6 Government Officers from Thailand participated in a comprehensive programme of training lasting 2 weeks. These trainees were Zonal Chiefs in their own country and their visit was sponsored by USAID. Their training programme consisted of 3 days of lecture/demonstrations in Colombo followed by field visits to Kurunegala and Anuradhapura.

As well as AMC staff coming to Colombo for training, METC staff visit the regions and carry out refresher training programmes for field assistants.

To date these programmes have been completed at Puttalam, Kurunegala, Maho, Anuradhapura, Trincomalee, Hingurakgoda, Kandy, Matale, Embilipitiya, and Matara.

The last of the Workshops dealing with supplementary methods of malaria control such as environmental and biological methods as well as the use of larvicides and space sprays took place at Matara and involved 10 P.H.I and 8 F.A. from both, Hambantota and Embilipitiya regions.

Three groups of United Nations Volunteer Doctors from India, Thailand and Burma, totalling 98 in all underwent refresher courses of training in Malariology prior to their being posted to their respective stations. A total of 212 Medical Officers have now been briefed on the principles and strategy of AMC operations in Sri Lanka since the inception of these courses in 1978.

At the request of the Secretary of the Social and Economic Development Centre, an orientation programme of lectures on the basic facts of malaria was conducted at the Centre Headquarters in Kynsey Road, during June 1980. The trainees were village community health workers who were being briefed on the common communicable diseases encountered in the country and the role they should play in motivating the general public in the prevention of such diseases.

A total of 107 new Field Assistants, recruited chiefly from spraymen, underwent a two-week orientation programme in malariology in September 1980. These new recruits were trained at regional level at Kurunegala, Hambantota, Badulla, Puttalam, Anuradhapura, Matale and Kandy.

A new grade of supervisor intermediate in status between Field Assistant and Public Health Inspector and designated Malaria Supervisor was established during the latter half of 1979 in an effort to intensify supervision of field operations (particularly spraying) at intermediate levels 51 such officers underwent an exhaustive course of training both at the MTTC in Colombo and in the field lasting 4 weeks, before being posted to their respective stations.

The usual training programmes for P.H.II., A.M.PP., R.M.PP., Family Health Workers (P.H.MI), primary health care workers (from the State Plantation Corporation) and personnel engaged in curative medicine were conducted on various occasions throughout the year. Also a total of 112 third year medical students were briefed on the principles and strategy of anti.malaria operations during November 1980 as part of their training in preventive medicine.

In addition an in-service refresher course of training was implemented for Entomological Assistants at Hambantota during December 1980 under the direction of the National Entomologist of the AMC.

An International Assessment Team consisting of Professors. R. Richter of Yugoslavia and E.M. Ungureanu from Romania was sent to Sri Lanka by WHO in December 1980 to evaluate the quality of training given at the METC since its inception. This team spent some two weeks in the Island and apart from visiting the METC also called at other teaching establishments such as Universities, MRI, NIHS Kalutara etc. Field visits were also paid to monitor the quality of training at regional level. The reports of this team has been received and is under study. Generally it could be stated that the Team has been very favourably unpressed with the quality of the training given by the METC.

A quantity of text books on technical subjects was purchased for the METC library under the annual vote set apart for this purpose. Notwithstanding, the Training Centre expressed the need for more books for loan to individual students and would welcome any donations in kind from anywhere in the world. Arrangements have been made for the Epidemiology Bulletin of the Department of Epidemiology to be reviewed directly.

Health education activities were intensified in certain localities particularly in the Mahaweli Development Scheme, in Anuradhapura and in the various pilgrim centres throughout the Island. These programmes were implemented at regional level by the RMO and his staff in conjunction with the Health Education Offices of the appropriate SHS Division.

Efforts were directed in these programmes to improve spray coverages, collect blood films from fever cases and impress on confirmed cases of malaria the need for taking the 5 day drug treatment.

The normal health education and film shows were held during the year.

The booklet on malariology which was written in English and Sinhalese was translated into Tamil and distributed to the Tamil speaking areas of the country.

Some members of the AMC staff had training abroad during 1980. They included the RMO/AMC Jaffna, RHL/AMC Matara and RMO/AMC Kurunegala as well as 8 P.H.I.I. and two Entomological Assistants.

The Review Team were most impressed with the scale of activities in the trainingpart of the Campaign and with the facilities available at the METC. They whole heartedly support the intention to inform all public Health workers, schools, universities and other institutions of the activities of the Anti-Malaria Campaign. The need to involve all medical personnel both on the curative and preventive sides, especially in the notification of fever cases, cannot be over-stressed.

VIII. Review of the participation of the Health Services in Surveillance and other anti-malaria activities :

Participation of the General Health Services in surveillance of malaria in supposed to consist of :

(i). Reporting of total OPD attendance, percentage of fever cases and clinical malaria cases.

(ii). Blood filming of suspected cases.

(iii). Investigation of malaria cases and treatment. Circulars have been repeatedly sent to all institutions to this effect.

Except in institutions where AMC staff were employed to take blood films from fever cases referred to them, there appeared to be very little cooperation from Health institutions. The shortcomings noted were :-

(a). Non-recording of fever cases.

(b). Any weekly returns were not being forwarded (this was evident from the scanty information available at the AMO Offices).

(c). Suspected malaria cases were not being blood filmed in many instances.

One of the obstacles appeared to be the definition of a "fever case", i.e. whether it is an "actual fever case" or a "recent fever case". A decision should be taken on this to correct an anomalous situation.

In institutions [illegible]ch there was only one officer (e.g. a Central Dispensary in-charge of an RMP or AMP), the collection of blood films, even from suspected malaria cases was not being carried out possibly due to lack of time. This is the typical PCD situation.

Another factor which may have led to blood films not being taken is the delay which sometime occurs in reporting back results. Thus treatment with anti-malarials may have been carried out on a provisional diagnosis.

The use of anti-malarial drugs by individual institutions, if properly monitored, may give some rough indication of the incidence of malaria in these areas - especially if blood filming is not being carried out.

A sample, showing degree of participation in one part of the country only, is appended as ANNEX :

IX. RECOMMENDATIONS

1. CASE DETECTION AND TREATMENT

1.1 Due to the absence of active case detection (ACD) and extremely unsatisfactory passive case detection (PCD) the screening for malaria cases is mostly carried out through the activated passive case detection (APCD) posts at the Health Institutions. In order to further improve and stabilise the case detection mechanism, it is strongly recommended that all health institutions in the receptive and vulnerable areas be activated without further delay.

1.2 Realising the importance of chemotherapy in effectively reducing the parasite load in the community, shortening the duration of suffering, giving relief to the patient-s and in protecting those engaged in development projects, the Review Team recommends the following:-

In order to make anti-malarial drugs readily available more Voluntary Treatment Centres, should be organised in the malarious areas, particularly in development projects, gem ing and chena areas, which should undertake the administration of single-dose presumptive treatment (600 mg. chloroquine base-adult dose) to all fever cases coming to such centres for relief.

In view of the operational problems encountered in the supervided administration of drugs for the radical treatment of positive cases, a single dose of 600mg. of chloroquine base (adult dose) together with 45mg. ofprimaquine should be administered at the Health Institutions and APCD posts to all fever cases at the time of taking blood smears. On receipt of the results of examination of the blood slides, the confirmed malaria cases should be contacted for the administratio-n of a full course of radical treatment. This may necessitate involving all PHC workers and deployment of additional personnel from the Anti Malaria Campaign.

Care should be taken however, that the drugs are not administered on empty stomach.

The potential role of PHC workers in this important task must be emphasised.

2. PROGRAMME PLANNING :

2.1. In the course of planning for the 1982-1986 phase of malaria control within the framework of current financial constraints, and as described in the document entitled " A preliminary outline towards drawing up a new malaria control programme for the period 1982-1986 " which is attached as Annex ... the Review Team would emphasize the following conditions as essential for stratification and possible withdrawal of insecticide coverage in a particular area :-

(a). The situation should be reliably clarified epidemiologically, taking into account previous malaria experience in the area.

(b). The case detection system should be strengthened to facilitate close monitoring.

(c). Emergency reserve operational units should be quickly available if required for epidemic control purposes.

3. ENTOMOLOGY:

3.1. In order to achieve even greater efficiency and to facilitate supervision, the present entomological staff should now be consolidated into 8 Mobile Units. Deployment of these units and details of duty implementation are left to the discretion of the S/ . .C.

3.2. As a rule concentration of entomological catching techniques should be on those giving the largest number of A.culicifacies. In most cases this would be by animal bait catches which can then supply the vector numbers required for susceptibility tests and, where necessary, bioassay tests. The present tendency to use other species for bioassay work is to be discouraged. Species variation in susceptibility is well known and susceptibility tests made with species like A.subpictus, A.annularis, A.vagus and A.hyrcanus have already aroused suspicion of malathion resistance in them especially in A.hyrcanus. Malathion susceptibility tests with A.culicifacies should be confined to 5% malathion for 30 minutes. If survivors occur this exposure period should be extended to one hour. Serious attempts to procure offspring and test them from survivors of 30 minuted and certainly of one hour should be made. In view of the recommendation concerning a B H C trial, intensive susceptibility tests on 0.4 dieldrin for one hour should be carried out in the area proposed for the trial and included in routine testing throughout the rest of the island. Bed-bugs should also be tested for B H C /dieldrin resistance especially in the area proposed for the B H C trial.

4. FIELD APPLIED RESEARCH :

4.1 Since no resistance to BHC has yet been detected in A.culicifacies in Sri Lanka and considering that the frequency of spraying of this insecticide should be less than for malathion, the Review Team suggests that a field trial of this insecticide at 0.5 gm. per square metre at six monthly intervals should be carried out. A comparison area should be sprayed with malathion at 2 grams per square metre four times a year.

4.2 The following main investigational topics are suggested in order to clarify the present epidemiological picture and to guide the future planning strategy of the Malaria Control Programme :-

(a) A study of organophosphate resistance as and when it arises in any species to determine the resistance spectrum so that possible alternative compounds can be identified.

(b) The mechanism(s) involved in D.D.T. resistance in A.culicifacies should be investigated with a view to determining any potential cross-resistance to synthetic pyrethroids. A D.D.T. susceptible strain of this species will need to be produced for this study.

(c) A comparison of the longevity of A.culicifacies from the same area in the dry and wet seasons should be made. Present evidence indicates a lower expectation of life, and hence, lower vector efficiency in the dry than in the wet season. Such an investigation could be made either from the determination of parity rates or from mark-release-recapture experiments.

(d) At least two sibling species are known in the taxon A.culicifacies. Only one has been recorded so far in Sri Lanka (species B) but the occurrence of a second, as has been shown in India, or even more, should not be ruled out and continue to be looked for. At present, identification can be made from the X-chromosome or from male sterility in hybrid males derived from the cross between species A female and species B male. If more than one species is identified studies on their comparative vectorial efficiencies should be made. The London School of Hygiene and Tropical Medicine is willing to identify the material.

(e) An investigation of the possibility that some of the other species on the island may also be vectors (e.g. A.subpictus) should be undertaken and in this respect the current methods of sporozoite concentration and identification should be used.

(f) Larval tests with *A. calicifacies* and other species should be carried out to establish base-line susceptibility data for the common larvcides.

5. STAFF :

5.1. The Review Team recognises the fact that ideally all vacancies for Medical Officers should be filled by Medical graduates. However in view of the serious shortage of Regional Medical Officers which is evidently seriously hampering the programme, the Team supports the principles of recruitment of science graduates for these posts.

Further, considering that -

(a). Good quality Science graduates are essential,

(b). Since there will be a considerable training investment, the recruits must stay with the malaria programme,

(c). The work involved includes both liaison with local officials and field supervision in ardous and demanding conditions,

the Review Team would stress the desirability of offering either (i). a suitably attractive salary scale, or (ii). worthwhile compensatory allowance in order to attract and retain a suitable calibre of staff.

6. SUPERVISION

6.1 Further improvement of quality of field operations will depend to a large extent on effective supervision exercised by all the echelons, including t ose at Headquarters. However the present rate of per diem appears to have a deterrent effect and, as such, supervision from higher echelons is often inadequat This problem should be carefully explored and some suitable solution found.

7. MANAGEMENT

7.1 In view of the public health importance and the economic significance of malaria control in Sri Lanka's development programme, as well as the considerable investment involved, the Review Team strongly recommends that the Malaria Advisory Committee be presided over, as before, by the Secretary of Health.

7.2 The Review Team strongly supports the recommendation, previously made by numerous evaluation teams in the past, that in order to ease the heavy administrative burden of the S/AMC so as to release him for more technical aspects of the programme, a Civil List Officer should be posted as Administrative Officer for the AMC.

7.3 The Review Team further supports the recommendation already made in the 1970 Review Report to the effect that the S/AMC should be up-graded to the level of Deputy Director.

7.4 To ensure efficient operations and quick remedial action the Review Team recommends that the Regional Malaria Officers be delegated some disciplinary powers in respect to Field Assistants in their Regions.

8. COMMUNITY PARTICIPATION

8.1 The report on co-operation with the Sarvodaya Shramadana Movement, which has been submitted to the Ministry after some modifications suggested by the Review Team, is strongly recommended for acceptance.

9. TRAINING

9.1 The Review Team considers it to be of the utmost importance that medical graduates in their internship should be given appropriate thorough orientation, as is done in India, with regard to the operations and significance of the AMC.

9.2 Seminars/Workshops for the Medical Officers or officers-in-Charge of Medical Institutions should continue to be conducted at Regional level, and training of all Primary Health Care staff in malaria should be organised at suitable localities.

9.3 The suggestions already made by the S/AMC for upgrading the malaria component in undergraduate medical training should be fully implemented, and the existing curricula in institutions such as Departments of Preventive Medicine and Parasitology should be reviewed to ensure adequate coverage of malaria as a disease.

10. SAFETY PRECAUTIONS

10.1 An improvement in protective clothing worn by spray teams is recommended. Long trousers in place of shorts, the provision of broader-brimmed hats with visors to protect the face, proper footwear and better-fitting chemical-resistant gloves are all needed. The provision of a good quality distinctive uniform for both Field Assistants and Sprayman would enhance their authority and might lead to fewer houses being missed.

Increased and regular attention to testing of cholinesterase levels should be carried out.

11. LOGISTICS:

11.1 In view of the complexity and magnitude of the supply system in the nation-wide AMC and the amount of Government funds committed to the programme, the Review Team recommends that:-

(a) Adequate space be provided to the Headquarters supply system, especially the vehicle spare parts supplies.

(b) Training in supply management and control be provided to the store-keepers at National level, and a similar course be provided for corresponding personnel at Regional and Sub-regional offices.

(c) Supervisory officers at all levels should take more interest in the supply systems at Regional And National Levels and make note of defects found or items to be followed up.

11.2 The operation of a smooth-working AMC within Sri Lanka relies on a functional and efficient transport system. The Review Team, as a result of its current review of the programme recommends that:-

(a) Recruitment be made to the vacant positions for Mechanics and Machinists.

(b) Broken pieces of equipment in the workshop, such as the re-winding machine, should be repaired and put back into use.

(c) The physical facilities at National Headquarters require work benches, cleaning and space for employees personal clothing and proper hygiene.

(d) A schedule of training or/and retraining of mechanical personnel should be carried out.

12. GEMMING AREAS :

12.1 The team recognizes that illegal gemming activities in Badulla, Moneragala and Matara Regions pose severe problems in the conduct of anti-malaria activities. The team supports the Superintendent's rationale in coping with this problem as expressed in his report of June 9, 1980, entitled "Increased spread of malaria due to illegal Gem Mining in Badulla, Moneragala and Matara Regions". The team encourages government efforts to restrict gemming in only authorised, controlled sites, to issue licences to only qualified persons and to fill abandoned pits.

13. FUTURE ASSESSMENT FORMAT AND TIMING :

13.1 Regarding the future assessment of the AMC the Review Team recommends the following :-

(a) An Internal Review (situation analysis) should be carried out by the officials of AMC assisted by MO staff members assigned to the Campaign and should last for 3 weeks during the period March / April every year. A report should be complied for information of the following External Review.

(b) An Independent (External) Review should be carried out for a period of 10 days during May / June every year by an external team composed of representatives of collaborating agencies, Superintendents of Health Services, concerned Government Departments and the Universities. The team will examine the findings of the Internal Review, together with the status of implementation of the recommendations made by previous Independent Review teams and make appropriate observations.

ACKNOWLEDGEMENTS

In closing, the Review Team would like to extend its heartfelt thanks and appreciation for all the co-operation, assistance and hospitality which have been extended to it.

The Review Team has great pleasure in acknowledging the kind reception and the excellent facilities placed at the Team's disposal by the Minister of Health, the Secretary of the Ministry of Health and the Director of Health Services.

The Team greatly appreciated the assistance and unfailing co-operation of the Superintendent of the Anti-Malaria Campaign and all his staff, both at Headquarters and in the field. The arrangements for travel and accommodation in the field were highly satisfactory.

The Team is grateful to the WHO Programme Co-ordinator for Sri Lanka and the WHO malaria staff for their whole hearted support.

The active participation of the local representative of US AID was extremely valuable, as always.

The presence and involvement of the representatives of the Ministries of Finance, Plan Implementation and External Resources was particularly appreciated.

The capable secretarial assistance afforded by Mr B. Nanayakkara, Miss Anne Therese Santiapopillai, Mrs L.P.de Silva, Miss Shayani Cooray, Miss Shakiya Hassim and Mr W.P. Edmund is gratefully acknowledged.

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BLOOD FILMS EXAMINED AND POSITIVES TO MALARIA AND MALARIOMETRIC INDEXES BY HEALTH AREAS IN THE WET ZONE OF SRI LANKA, 1979 - 1980.

ANNEX I
TABLE "A"

No.	Health Area	1979 Blood Examd.	1979 Films Postvs.	1979 ABER	1979 SPR	1979 API	1980 Population	1980 Blood Examd.	1980 Films Postvs.	1980 ABER	1980 SPR	1980 API	Ref. No. to Map
1	Galigamuwa	3247	69	4.0	2.13	0.8	78,000	4728	70	6.0	1.5	0.9	71
2	Nawalapitiya	4282	59	1.9	1.38	0.2	240,000	3283	86	1.4	2.62	0.4	82
3	Gampola	3842	112	2.3	2.92	0.7	161,000	2095	46	1.3	2.20	0.3	81
4	Nuwara Eliya	115	10	0.03	8.70	0.02	390,000	65	8	0.02	12.31	0.02	80
5	Kadugannawa	4959	70	3.01	1.41	0.4	164,000	4971	66	2.9	1.33	0.4	83
6	Ratnapura	7213	71	2.3	0.98	0.2	316,000	7386	217	2.3	2.94	0.7	65
7	Kirindiwela	5470	349	3.1	6.38	1.9	182,000	2288	104	1.3	4.55	0.6	92
8	Gampaha	3842	112	2.3	2.92	0.4	161,000	309	67	0.2	21.68	0.[illegible]	89
9	Dehiwela	449	76	0.3	16.93	0.5	160,000	40	10	0.02	25.00	0.06	97
10	Kegalle	1413	85	1.2	6.02	1.1	72,000	3490	132	2.3	3.78	1.8	69
11	Mawanella	6174	408	3.9	6.61	2.5	152,000	5590	265	3.5	4.74	1.7	72
12	Dehiowita	7314	373	5.0	5.17	2.7	138,000	5103	157	3.7	3.08	1.1	67
13	Ruwanwella	3995	366	3.2	9.66	3.3	118,000	5068	160	4.3	3.16	1.4	68
14	Padukka	2496	746	1.9	29.86	5.4	145,000	1371	162	0.9	11.89	1.1	96
15	Warakapola	4253	89	4.0	2.09	2.8	98,000	5147	186	4.9	3.61	1.9	70
16	Kheliyagoda	7913	794	6.9	10.03	7.0	115,000	7074	480	6.1	6.79	4.2	66
17	Colombo M.C.	23960	134	3.5	0.19	0.2	719,000	17137	109	2.4	0.6	0.1	99
18	Panadura	382	58	0.20	0.30	0.3	189,000	15	2	0.01	13.3	0.01	100

BLOOD FILMS EXAMINED AND POSITIVES TO MALARIA AND MALARIOMETRIC INDEXES BY HEALTH AREAS [illegible]

SRI LANKA, 1979 - 1980 (contd.)

TABLE "A"

No.	Health Area	1979 Blood Exmd.	1979 Films Postvs.	1979 ABER	1979 SPR	1979 API	1980 Population	1980 Blood Exmd.	1980 Films Postvs.	1980 ABER	1980 SPR	1980 API	Ref. No. to Map
19	Horana	8099	189	5.06	1.18	1.2	156,000	4864	71	3.1	1.5	0.5	101
20	Agalawatta	950	67	0.51	0.36	0.4	180,000	1332	146	0.7	11.0	0.8	103
21	Ambalangoda	0	0.	0	0	0	191,000	84	7	0.4	8.3	0.04	59
22	Galle F.G.	0	0	0	0	0	62,000	0	0	0	0	0	56
23	Unawatuna	40	8	0.03	0.05	0.04	165,000	0	0	0	0	0	57
24	Baddegama	0	0	0	0	0	155,000	00	0	0	0	0	58
25	Elpitiya	0	0	0	0	0	82,000	0	0	0	0	0	60
26	Matugama	90	4	0.09	0.04	0.04	103,000	0	0	0	0	0	104
27	Kalutara	0	0	0	0	0	200,000	0	0	0	0	0	102
28	Moratuwa	0	0	0	0	0	241,000	0	0	0	0	0	98
29	Homagama	17	2	0.01	0.01	0.01	199,000	0	0	0	0	0	95
30	Kotte	0	0	0	0	0	58,000	0	0	0	0	0	94
31	Kolonnawa	15	4	0.01	0.04	0.04	106,000	2	0	0	0	0	93
32	Kelaniya	36	3	0.02	0.01	0.01	250,000	0	0	0	0	0	91
33	Galle M.C.	0	0	0	0	0	82,000	0	0	0	0	0	62
34	Induruwa	0	0	0	0	0	83,000	0	0	0	0	0	61
	Total	100,568	4283	1.7	4.3	0.7	5,917,000	81,442	2,552	1.4	3.1	0.4	-

BW;

No.	Health Area	1979 Blood Exam'd.	1979 Films Postvs.	1979 ABER	1979 SPR	1979 API	Population	1980 Blood Exam'd.	1980 Films Postvs.	1980 ABER	1980 SPR	1980 API	Ref. No. to Map
1	Dankotuwa	3974	63	3.5	1.6	0.5	120,000	1914	51	1.6	2.7	0.4	19
2	Kandy M.C.	3946	18	3.5	0.46	0.2	112,000	3139	12	2.8	0.38	0.1	84
3	Maturata	8291	122	8.5	1.48	1.3	90,000	5799	80	6.4	1.38	0.9	78
4	Palatuoya	899	1	0.8	0.11	0.01	107,000	731	1	0.7	0.14	0.01	79
5	Werellagama	3137	141	1.5	4.49	0.7	202,000	2343	106	1.2	4.52	0.5	75
6	Kochchikade	6050	233	4.6	3.85	1.7	137,000	3150	83	2.3	2.63	0.6	85
7	Bandarwela	4398	226	3.8	5.1	1.9	117,000	4075	191	3.5	4.7	1.6	[illegible]
8	Welimada	6168	101	3.4	1.6	0.6	180,000	3832	91	2.1	2.4	0.5	45
9	Ja - Ela	1856	109	0.6	5.87	0.4	305,000	1464	44	0.7	3.01	0.1	90
10	Negombo	1359	12	1.3	0.88	0.1	111,000	774	12	0.7	1.55	0.1	86
11	Akuressa	539	26	0.7	4.82	0.3	79,000	1703	88	2.2	5.17	1.1	54
12	Wattegama	17191	216	3.5	1.26	1.4	63,000	15156	175	24.0	1.15	2.8	76
13	Medamahanuwara	7135	164	6.4	2.30	1.5	112,000	3987	127	3.6	3.19	1.1	77
14	Kamburupitiya	571	123	0.5	23.12	1.0	112,000	2511	181	2.2	7.21	1.6	51
15	Matara	3197	437	1.7	13.67	2.3	192,000	4513	268	2.3	5.94	1.4	52
16	Matale	4000	289	2.9	7.23	2.1	139,000	9618	443	6.9	4.61	3.2	35
17	Marawila	1746	122	2.3	7.0	1.6	79,000	3619	188	4.6	5.2	2.4	18
18	Moonamaldeniya	166	9	0.3	0.05	0.1	57,000	4138	169	7.3	4.08	3.0	28
19	Rattota	1661	220	3.4	13.2	4.5	50,000	1360	171	2.7	12.57	3.4	33
													 2

BLOOD FILMS EXAMINED AND POSITIVES TO MALARIA AND MALARIOMETRIC INDEXES BY HEALTH AREAS IN THE INTERMEDIATE ZONE OF SRI LANKA, 1979 - 1980 (contd.)

ANNEX I
TABLE "B"

No.	Health Area	1979 Blood Exmnd.	1979 Films Postvs.	1979 ABER	1979 SPR	1979 API	1980 Population	1980 Blood Exmnd.	1980 Films Postvs.	1980 ABER	1980 SPR	1980 API	Ref. to Map
20	Tangalle	7945	739	6.8	9.3	6.3	116,000	5333	285	4.6	5.34	2.5	48
21	Walasmulla	3305	294	2.0	8.9	1.7	167,000	5479	326	3.3	5.95	1.9	49
22	Kandanegedera	19006	324	24.4	1.7	4.5	78,000	9476	300	12.5	3.17	3.8	29
23	Mirigama	10167	1157	9.5	11.4	10.8	111,000	7116	423	6.4	5.94	3.8	88
24	Attakalampanna	15662	884	8.3	5.6	4.7	192,000	11755	712	6	6.06	3.7	63
25	Balangoda	17105	905	11.4	5.3	6.1	153,000	13022	676	8.5	4.39	4.4	64
26	Badulla	20405	513	5.1	2.5	1.2	397,000	17846	1767	4.5	9.90	4.4	44
27	Hakmana	9665	493	11.5	5.1	6.0	83,000	6248	325	7.5	5.20	3.9	50
28	Kurunegala	1571	226	1.2	14.4	1.7	128,000	6034	461	4.7	7.64	3.6	25
29	Polgahawela	8831	677	9.1	7.7	6.9	96,000	7125	591	7.4	8.29	6.2	30
30	Naranmala	10485	1389	17.2	13.2	22.8	60,000	3818	496	6.4	12.99	8.3	31
31	Galagedera	3531	331	6.2	9.4	5.8	56,000	2717	294	4.8	10.82	5.2	74
32	Mawatagama	7729	1492	13.3	19.3	25.7	93,000	6162	932	6.6	15.12	10.0	26
33	Kuliyapitiya	8141	1131	9.9	13.9	13.8	82,000	6930	1149	8.4	16.58	14.0	27
34	Rambukkana	4320	1381	6.4	32.0	20.6	63,000	6166	752	9.8	12.2	11.9	73
35	Weligama	0	0	0	0	0	66,000	0	0	0	0	0	53
36	Kotapola	123	0	0	0	0	133,000	8	0	0	0	0	75
37	Minuwangoda	2245	40	2.0	1.8	0.3	118,000	84	0	0	0	0	87
	Total	230,836	15989	5.1	6.9	3.5	4,619,000	195,311	12727	4.2	6.5	2.75	-

bn.

BLOOD FILMS EXAMINED AND POSITIVES TO MALARIA AND MALARIMETRIC INDEXES BY HEALTH AREAS IN THE DRY ZONE OF SRI LANKA, 1979 - 1980

ANNEX I
TABLE "C"

No.	Health Area	1979 Blood Exmd.	1979 Films Postvs.	1979 ABER	1979 SPR	1979 API	1980 Population	1980 Blood Exmd.	1980 Films Postvs.	1980 ABER	1980 SPR	1980 API	Ref. No. to Map
1	Manipay	3280	65	3.07	1.98	0.6	103,000	4042	36	3.9	0.89	0.3	2
2	Tellipalai	1970	23	1.60	1.17	0.2	119,000	5820	27	4.9	0.46	0.2	3
3	Jaffna	13967	675	11.08	4.83	5.3	122,000	6309	70	5.2	1.11	0.6	4
4	Kopay	5626	63	5.31	1.62	0.6	103,000	7851	35	7.6	0.45	0.3	5
5	K'ks.	1928	22	1.60	1.1	0.2	117,000	5846	30	5.0	0.6	0.3	5
6	Point Pedro	8200	140	6.83	1.71	1.2	116,000	6879	55	5.9	0.80	0.5	6
7	Batticaloa	22884	320	14.4	1.4	2.0	117,000	18795	181	10.6	1.0	1.0	41
8	Mayts	11949	147	13.73	1.23	1.7	84,000	9387	141	11.2	1.50	1.7	1
9	Thirukovil	6290	229	6.3	3.6	2.3	95,000	6009	140	6.3	2.3	1.5	40
10	Chavakachcheri	5687	243	7.09	4.26	3.4	70,000	10251	178	14.6	1.83	2.7	7
11	Gokarella	6629	164	4.10	2.5	1.0	138,000	8000	385	5.8	4.8	2.8	22
12	Kalmunai	20736	194	18.1	0.9	1.7	138,000	15921	298	11.5	1.9	2.2	38
13	Kilinochchi	33811	904	54.53	2.67	8.7	60,000	29794	525	49.7	0.85	8.7	8
14	Trincomalee	20661	542	9.48	2.62	2.3	237,000	8383	880	3.5	10.50	3.7	15
15	Kekirawa	21869	1166	13.58	5.33	6.8	175,000	16267	898	9.3	5.52	5.1	13
16	Valachchenai	35222	1049	25.5	2.9	7.6	143,000	23689	568	16.6	2.4	4.0	37
17	Amparai	28627	499	24.8	1.7	4.3	103,000	18302	552	17.8	3.0	5.4	39
18	Chilaw	8181	249	7.2	3.0	2.2	120,000	5655	535	4.7	9.5	4.5	17

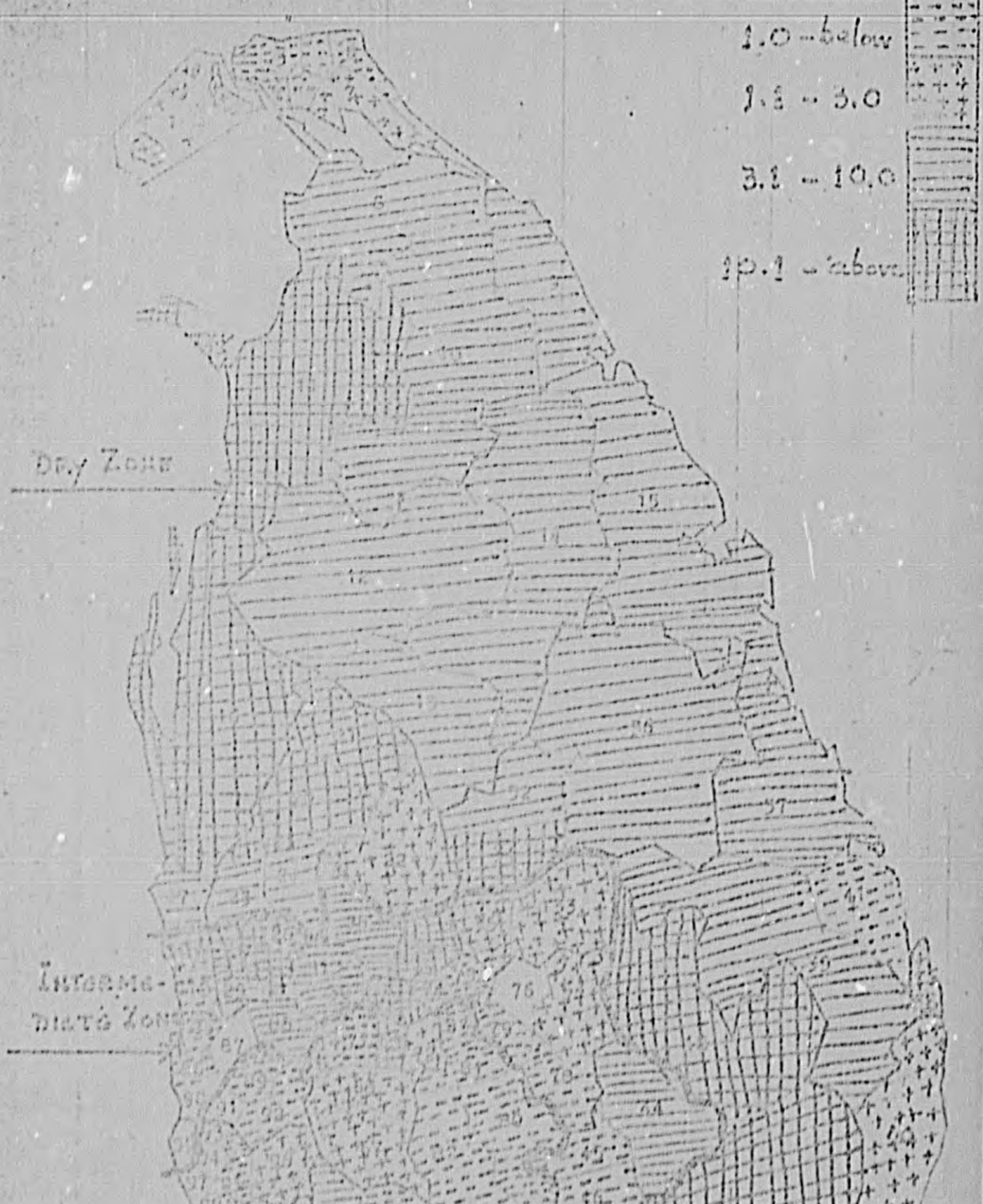
BLOOD FILMS EXAMINED AND POSITIVES TO MALARIA AND MALARIOMETRIC INDEXES BY HEALTH AREAS IN THE DRY ZONE OF SRI LANKA, 1979 - 1980 (contd.)

ANNEX I
TABLE "C"

No.	Health Area	Blood Exmd.	Films Postvs.	ABER	SPR	API	Population	Blood Exmd.	Films Postvs.	ABER	SPR	API	Ref. No. to Map
19	Wariyapola	7357	392	5.0	5.3	2.7	168,000	9909	636	5.9	6.4	3.8	24
20	Mullativu	14636	576	43.5	3.94	9.6	37,000	10682	351	28.9	3.29	9.5	9
21	Vavuniya	22749	768	29.54	3.38	11.6	84,000	13013	769	15.5	5.91	9.1	10
22	Anuradhapura	7654	1322	3.91	17.27	5.6	213,000	23386	2195	11.0	9.39	10.3	12
23	Kahatagasdigiliya	5958	273	6.05	4.58	2.8	95,000	10015	684	10.5	6.53	7.2	14
24	Eingiriya	1147	154	1.6	13.4	2.2	72,000	3867	426	9.4	11.0	5.9	23
25	Dambulla	24914	595	21.5	2.4	5.0	133,000	24528	856	18.4	3.5	6.4	32
26	Polonnaruwa	32944	955	32.0	3.0	9.3	110,000	14033	1100	12.7	7.8	10.0	36
27	Mannar	19323	850	22.73	4.40	9.1	92,000	12352	1105	13.4	8.95	12.0	11
28	Puttalam	44121	2905	29.2	6.5	19.2	146,000	39559	5877	27.1	14.8	40.2	16
29	Maho	17717	527	15.9	3.0	4.7	121,000	19521	1352	16.1	11.2	11.2	20
30	Galgamuwa	13319	743	17.08	5.58	13.6	78,000	9636	1674	12.3	17.37	21.5	21
31	Naula	37130	1556	76.1	4.6	34.9	37,000	20126	752	54.4	3.7	20.3	34
32	Bibile	27798	2367	20.9	8.5	17.8	116,000	24552	2957	21.2	12.0	25.5	42
33	Moneragala	49641	3372	34.71	6.79	26.4	106,000	56294	4325	53.1	7.7	40.8	43
34	Hingurakgoda	70051	1988	56.0	2.8	15.9	78,000	34767	1767	44.6	5.1	22.6	36
35	Hambantota	40143	3870	34.31	9.64	32.2	115,000	23839	2158	20.7	9.05	18.8	47
	Total	690,919	29,906	17.5	4.3	7.6	4,020,000	557,279	34,528	13.9	6.2	8.6	

Annex 2.

Malaria Annual Parasite Incidence Sri Lanka, 1980.



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HEALTH AREAS BY S.H.S. DIVISIONS

S.H.S. Jaffna

1. Kayts
2. Manipay
3. Tellipalai
4. Jaffna
5. Kopay
6. Point Pedro
7. Chavakachcheri
8. Kilinochchi
9. Mullaitivu
10. Vavuniya
11. Mannar

S.H.S. Anuradhapura

12. Anuradhapura
13. Kekirawa
14. Kahatagasdigiliya
15. Trincomalee

S.H.S. Puttalam

16. Puttalam
17. Chilaw
18. Marawila
19. Dankotuwa

S.H.S. Kurunegala

20. Mabe
21. Dalgamuwa
22. Gokarella
23. Bingiriya
24. Wariyapola
25. Kurunegala
26. Mawatagama
27. Kuliyapitiya
28. Maunasaldeniya
29. Kandanegedara
30. Polgahawela
31. Narammala

S.H.S. Matale

32. Dambulla
33. Rattota
34. Naula
35. Matale
36. Hingurakgoda

S.H.S. Batticaloa

37. Valachchenai
38. Kalmunai
39. Amparai
40. Tirukkovil
41. Batticaloa

S.H.S. Badulla

42. Bibile
43. Monaragala
44. Badulla
45. Welimada
46. Bandarawela

S.H.S. Matara

47. Hambantota
48. Tangalle
49. Walasmulla
50. Hakmana
51. Kamburupitiya
52. Matara
53. Weligama
54. Akuressa
55. Katupola

S.H.S. Galle

56. F.C. Galle
57. Unawatuna
58. Baddegama
59. Ambalangoda
60. Elpitiya
61. Induruwa
62. M.C. Galle

S.H.S. Ratnapura

63. Atakalanpanna
64. Balangoda
65. Ratnapura
66. Embilipitiya

S.H.S. Kegalla

67. Dehiowita
68. Ruwanwella
69. Kegalla
70. Warakapola
71. Galigamuwa
72. Mawanella
73. Rambukkana

S.H.S. Kandy

74. Galagedera
75. Werellagama
76. Harispattu
77. Medamahanuwara
78. Maturata
79. Talatuoya
80. Nuwara Eliya
81. Gampola
82. Nawalapitiya
83. Kadugannawa
84. Kandy

S.H.S. Colombo North

85. Kochchikade
86. Negombo
87. Minuwangoda
88. Mirigama
89. Gampaha
90. Ja-ela
91. Kelaniya
92. Kiriudiwela

S.H.S Colombo South

93. Kolonnawa
94. Kotte
95. Homagama
96. Padukka
97. Dehiwela
98. Moratuwa
99. Colombo M.C.

S.H.S. Kalutara

100. Panadura
101. Horana
102. Kalutara
103. Agalawatta
104. Matugama

NS/-

ANNEX 3

Summary of Spraying Operations - 1980

	Round			
	10	11	12	13
1. Population	3,374,681	3,413,793	3,307,162	3,411,046
2. No.of houses				
Target	945,556	944,989	967,021	945,593
Found	944,989	967,021	945,593	956,763
Fully sprayed	605,497	600,990	569,293	581,837
Partially sprayed	221,142	231,203	228,169	236,315
Closed	56,513	56,687	62,231	69,326
refused & others	61,837	78,141	85,900	69,285
3. % spray coverage				
Fully sprayed	64.0	62.1	60.2	60.8
Partially sprayed	23.4	23.9	24.1	24.7
Not sprayed	12.6	13.9	15.7	14.5
4. Malathion 50 0 2 gr/m^2				
Total lbs.used	1,116,390	1,061,759	1,073,751	1,120,746
lbs./capita	0.33	0.31	0.32	0.33
lbs/ house	1.35	1.27	1.34	1.37
5. Spraying dates				
Commencement	30-10-79	16-01-80	15-04-80	18-07-80
Completion	26-06-80	19-07-80	10-10-80	21-02-81

ANNEX 4

1980 Focal and Seasonal Spraying Reported

Region	Houses	Population	1 lbs.Malathion
Badulla	812	3,926	1,016
Hambantota	412	1,654	1,108
Monoragala	9,354	28,321	10,290
Ehbilipitiya	1,332	3,878	1,620
Jaffna	408	1,713	772
Vavuniya	2,435	11,203	2,830
Kurunegala	7,992 *	31,968.	10,629
Total:	22,745	82,663	28,265

*estimates based on population

ANNEX - 5

A. M. C. BUDGET SUMMARY 1978 - 1981

Year	Budget Requested Rs.	Budget Approved Rs.	Budget Alloted Rs.	Budget Expended Rs.
1978	82,775,550	82,775,550	82,775,550	86,348,570
1979	136,531,100	136,531,100	136,531,100	120,627,093
1980	133,388,925	82,763,100	82,763,100	81,481,350
1981	112,272,858	105,543,300	105,543,300	

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bn

ANNEX - 8

A. M. C. FISCAL STATUS FOR PERIOD 1977 - 1981

1. OVERALL

YEAR	TOTAL NATIONAL BUDGET Rs.	TOTAL HEALTH MINISTRY BUDGET Rs.	% OF HEALTH BUDGET OF NATIONAL BUDGET	TOTAL APPROVALS AMC BUDGET Rs.	% OF AMC BUDGET OF HEALTH MIN. BUDGET
1977	9,575,758,185	512,754,900	5.35	100,855,700	19.67
1978	15,885,075,656	526,298,409	3.30	82,775,550	15.67
1979	19,614,897,611	861,924,898	4.39	136,531,100	15.84
1980	23,463,526,326	882,082,097	3.75	82,763,100	9.38
1981	28,521,548,195	997,155,640	3.49	105,543,300	10.58

ANNEX 7

A Preliminary Outline Towards Drawing up a New Malaria Control Programme for the Period 1982 - 1986

* *

With the Annual Evaluation to be held in May, June, 1981 a serious decision will have to be taken on the Intensive Malaria Control Programme.

Delimitation of Malarious Areas will be carried out as a first step by the MHS Team with National Assistance before the next evaluation.

(1) Areas both receptive and vulnerable to have 4 rounds of spray.

(2) Areas less receptive and vulnerable with Seasonal spray April / May and September / October.

(3) Areas with focal spray during drought periods and pooling of the river beds in the epidemic zone.

As regards (1) -

(a) The fact that transmission in the hyper/endemic areas and development scheme areas is essentially along the river banks and irrigation channels should be taken into consideration.

(b) Receptive and Vulnerable areas such as chena areas in the Dry Zone where most of the transmission is concentrated.

Gemming Areas will have to be treated differently -

(I) The development of Treatment Centres - Voluntary and A.I.C.

(2) Distribution and administration of drugs by AHC, General Health Services and Volunteers.

(3) (i) The filling of Gem pits by legislation and legalisation of illicit Gemming.

(ii) The feasibility of establishing biological methods of control such as the introduction of annual fish such as Notobranchius.

(iii) Finally spraying and mop up spraying of temporary structures etc.

(4) The Improvement of the Surveillance Mechanism.

There are 579 Medical Institutions of difference categories and grades throughout the Malarious areas of the Country.

At present only 102 areas are activated at least 400 - 450 of these should be activated.

(Contd.)

The remaining PCD institutions should be motivated to record all fever cases, take blood films and give the correct treatment.

Investigations of vivax and falciparum cases should be carried out by the Sanitarians of the AMC. For investigations of P.vivax cases the range P.H.II of the General Health Services could also be utilised.

One of the biggest problems in the present programme is the administration of the 5 days Radical Treatment. The utilisation of range Midwives and volunterrs for personal administration of A.M.C. drugs must be seriously considered as the A.M.C. personnel are inadequate to perform this important task.

The operations and Research Unit must be expanded as suggested by the 2nd Annual Evaluation Team.

The inclusion of an additional Parasitologist and Entomologist is essential.

The Training Centre must be expanded and should include another Medical Officer. The Training Centre should also take over the coordination of the various field research projects of the Campaign.

Immediate Intensified Training of the Medical Officers, Nurses, Midwives and Public Health Inspectors in the General Health Services will be dominant programmes which would also include the training of new recruits and in-service training of AMC personnel. Of course training of volunteers, and workshops for other Departmental personnel will also continue and be intensified.

The Entomological Unit should be expanded. At least one Entomological Unit should be established in each region. The establishment of an intermediate category of staff between the Entomologist and Entomological Assistants should be considered. The establishment of an Insectary and other facilities for research and operations will have to be provided. Administrative. Some of the main drawbacks of the present programme must be remedied.

(a) Recruitment procedures must be facilitated so that vacancies are filled immediately.

(b) The replacement of Medical Officers by Science Graduates due to the dearth of Medical Officers available for the regions.

(c) The inclusion of an Administrative Officer to take away the burden of routine Administrative work so as to enable the Superintendent and the Technical Officers to focus more attention on the technical aspects of the programme.

(Contd.)

The question of re-organising the Ministry of Health is also engaging the attention of the Government. The objective is to further decentralise the activities of the Department of Health and organise the day-to-day activities under Regional Directors, who will be supported by Boards of Management. Each province may have a Board, so will the G.H., Colombo and G.H. Kandy, which are Teaching Hospitals. R.D. may be the Chairman and Chief Executive of the Board. S.H.SS. will function under the R.D. The R.DD. and the Boards will subject to the general and where necessary, specific direction of the Ministry of Health, which will have certain reserve powers. Certain Divisions of the Health Department, such as M.R.I., S.M.S., E.M.E. and the A.M.C. will be organised as separate Departments under the Ministry. A white paper will be presented to the Cabinet by the end of the year.

In keeping with the New National Health Plan, a new plan to cover a Malaria Control Programme from 1982 - 1988 will be drawn up.

To summarise (the Anti-Malaria Campaign will function as a separate Department). The programme will be -

(1) A limited 3 monthly cycle with Malathion - 4 cycles.

(a) Along the river banks.

(b) Along Irrigation channels and development project areas with high transmission potential.

(2) Chena areas Mop up spraying and Intensified treatment.

(3) Together with Intensified Surveillance personal administration of drugs, to positive cases - utilisation of personnel of General Health Services and Volunteers.

(4) Investigation of all malaria cases follow-up and remedial measure - P.H.II. A.M.C. and range P.H.I. of G.H.S.

(5) Seasonal spraying - 2 cycles before June and December peaks.

(6) Gemming Areas -

(a) Filling up of Gem pits.

(b) Use of Aquatic Plants

(c) Treatment centres.

(7) Extension of Integrated Methods of Control where ever applicable -

(a) Adulticidal Measures - Fogging, ULV techniques.

(Contd.)

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(b) Use of larvivorous fish - based on the field research project - Mapping of areas nurseries of suitable indigenous fish and timely introduction.

(c) Intermittent flushing - Extension to area other than Polgolla and Ukuwela.

(d) Larviciding with abate during drought periods along Menik Ganga and Kirindi Oya. Extension to other areas wherever applicable.

(8) Monitoring of field research projects - epidemiology Entomology and Drug Therapy. Extension according to personnel and resources available.

(9) The Establishment of Epidemiological and Entomological Criteria for Evaluation of the 2nd Control Programme.

(10) Phased integration of the Malaria Control Programme with the General Health Services or the Establishment of a VBC Unit or Department within the General Health Services plans by 1987.

(11) Training to be correlated with the objectives and final outcome of this programme.

(12) Is Eradication possible after 1986?

Funding will be necessary for the provision of Malathion or any other insecticides, Abate for larviciding, insecticide for fogging and ULV spraying.

Funds will be necessary for training of officers on techniques of malaria control research.

Funds will be necessary for equipment and expertise on short-term basis depending on the techniques used.

Funds are necessary for research and training and updating the present training centres.

Bi-lateral Aid from US AID Netherlands UK and the Japanese will have to be sought for the 2nd Modified Operations Plan on compassing 1982 - 1986.

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'Office of the Superintendent,'
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Colombo 5. 28th October, 1980.

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ANNEX - 8

Days after Spray	Species	Actellic 1 g/m² Mud	Actellic 1 g/m² Wood	Actellic 1 g/m² Roof	Actellic 2 g/m² Mud	Actellic 2 g/m² Wood	Actellic 2 g/m² Roof	Malathion 2 g/m² Mud	Malathion 2 g/m² Wood	Malathion 2 g/m² Roof	Control
27	culicifacies	100(30)	100(10)	-	100(30)	100(10)	-	73(30)	100(10)	-	0(30)
18 - 20	varuna	100(30)	100(10)	100(10)	100(60)	100(20)	100(20)	100(60)	100(20)	100(20)	0(50)
67 - 70	"	10(90)	83(30)	3(30)	88(90)	90(30)	30(30)	5(60)	85(17)	5(20)	0(80)
92 - 95	"	11(90)	3(30)	27(30)	23(90)	97(30)	100(30)	20(60)	65(20)	20(20)	0(80)
26 - 28	annularis	17(60)	100(20)	-	100(60)	100(20)	-	48(60)	95(20)	-	2(60)
47 - 49	"	77(60)	100(20)	100(10)	100(60)	100(20)	100(20)	43(30)	100(10)	90(10)	0(50)
60 - 61	"	53(30)	90(10)	50(10)	100(60)	100(20)	100(20)	47(60)	55(20)	75(20)	0(50)
70 - 72	"	53(60)	65(20)	30(20)	100(60)	95(20)	95(20)	100(60)	100(20)	100(20)	0(60)
24	hyrcanus	57(30)	100(10)	-	87(30)	100(10)	-	-	-	-	0(20)
30 - 32	"	7(30)	50(10)	10(10)	73(30)	100(10)	60(10)	70(30)	100(10)	100(10)	0(30)
46 - 50	"	44(90)	60(30)	-	34(90)	97(30)	-	3(90)	97(30)	-	0(90)

Table Tonigala Actellic Field Trial

A comparison of bioassay test mortalities on Actellic 1 g/m² and 2 g/m² and Malathion 2 g/m²

(Numbers in brackets are actual numbers of mosquitoes tested).