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R E P O R T
OF
WHO/CIDA/JICA/USAID
EVALUATION OF THE
VBDC PROGRAMME IN BURMA
18-27 FEBRUARY 1985

REPORT OF 1985 EVALUATION MISSION

1. Introduction

Vector borne diseases are the cause of a great deal of morbidity and considerable mortality in Burma. Foremost among these is malaria. Dengue, dengue haemorrhagic fever (DHF) and filariasis are also of considerable importance and cases of Japanese Encephalitis are sporadically seen.

In the first country health programming exercise carried out in 1976, plans were laid down for a Vector Borne Disease Control Programme unifying existing but separate malaria, DHF and filariasis programmes. The first People's Health Plan (PHP) for 1978 to 1982 gave the number one priority to malaria out of 51 priority diseases or conditions whereas in the second PHP for 1982-1986 it was second to diarrhoeal disease (out of 56 priority diseases/conditions). In the present PHP for 1986-1990 now under preparation malaria is again the first priority out of six diseases listed.

Due to a shortage of funding and particularly of convertible currencies external support has been necessary and the WHO and UNICEF provided various types of support in international staff and supplies and equipment such as limited quantities of insecticides, sprayers, anti-malaria drugs and vehicles. In 1978 The Canadian International Development Agency (CIDA) signed a Memorandum of Understanding between Burma, The WHO and Canada to provide the sum of Canadian \$ 5,650,000 over a period of 5 years with a limit of Canadian \$ 1,085,000 in any one year, these funds to be administered through the WHO. These funds were entirely for the purchase of insecticides (DDT), spraying equipment, anti-malarial drugs, vehicles and other supplies.

In addition, the Netherlands Ministry of Development Cooperation, Directorate-General of International Cooperation (DGIC) also agreed in 1978 to provide a sum of US\$ 425,000 to cover the costs of two WHO staff members (in addition to a third staff member whose cost was covered by WHO) to provide technical support to the VBDC and CIDA supported project.

Canadian support will continue until the end of 1984-85 fiscal year. Netherlands support has terminated with the provision of the allotted US\$ 425,000 and WHO support continues under project Burma VBC 001.

Under the Terms of the Memorandum of Understanding, an interim evaluation was carried out in 1980 while further evaluations were carried out with donor participation in February 1982, and February 1984.

The present evaluation took place from 17 to 27 February 1985 and is the fourth evaluation. The Terms of Reference for this evaluation were as follows:

2. Terms of Reference

- (1) Review briefly the progress made towards the fulfilment of the recommendations of the evaluation of 1984.
- (2) Review the overall programme implementation and present an analysis of the present situation.
- (3) Review case finding programmes, their effectiveness and population coverage during the field visit.
- (4) Discuss insecticide usage, including environmental impact and resistance of mosquitoes.
- (5) Review manpower development and career structure planning.
- (6) In the light of the foregoing, discuss the present effectiveness of the VBDC project and its potential for the future.
- (7) Review the programme needs for external collaboration.
- (8) Prepare a short report on the meeting and make recommendations to improve VBDC activity for attracting future external support in the light of the wishes and intent of the Government of Burma and in light of the overall discussions.

3. Members of the Evaluation Team

C I D A

1. Mr. Pierre Heroux - Project Team Leader, CIDA
2. Dr Richard Garfield Lalonde - Health Consultant, CIDA

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1. Dr N.G. Gratz - Director, VBC, HQ, Geneva
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1. Dr J. Akiyama - Vector Scientist, VBDC Project
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Annexes I to III provide the programme of the team's visits, including the places seen and persons with whom discussions were held as well as the full addresses of the evaluation team members.

4. Progress towards fulfilment of 1984 recommendations

(For ready reference the recommendations of the 1984 evaluation team are appended as Annex VI).

(a) Surveillance

- (1) Representative indicator areas in drug and spray areas were selected in 5 States and 6 Divisions involving 174 villages and 405,029 population for a more accurate collection and analysis of surveillance parameters. However, the ABER in these indicator villages as a whole was only 2.99 per cent compared with 2.3 per cent and 5.26 per cent for the whole of the drug and spray areas respectively. Case investigations of laboratory confirmed malaria cases to determine place of transmission have been instituted to the extent of questioning patients regarding recent travel and exposure.
- (2) The collection of blood slides has been intensified in many areas with targets having been set within the health services. Over the past year there has been an increase in the ABER in the spray and drug areas. Over the past few years the ABER has been steadily increasing in the drug, spray and surveillance areas, and has markedly increased in the vigilance areas, since 1982, where there are both ACD and PCD activities. The highest blood examination rates were in the sprayed areas.
- (3) The quantity of blood smears collected continue to outstrip the capacity to examine them in a timely and accurate fashion.
- (4) The "Situation Analysis in 1976-1984" reports on 3 long term entomological studies carried out in areas under insecticide

spraying and a small number carried out in development areas and on focal surveys. These studies are good but limited in scope and number due to the severe shortage of entomological personnel in the VBDC programme as well as transport and funding.

- (5) Limited studies were carried out in areas of ecological change to investigate the anopheline fauna, especially primary and suspected vectors. Their seasonal prevalence, their bionomics focused on determining the transmission season and their susceptibility status to DDT and other insecticides was studied.

These observations have provided useful information. However, due to a serious lack of trained personnel there is still a gap in information on the entomological factors in malaria transmission.

Activities are at present dependent largely on periodic visits by staff from Rangoon.

- (6) The number of cases of DHF in 1984 has been presented by States and Divisions. There were a total of 2,323 DHF cases with 39 deaths. Most of the DHF cases and deaths were in Rangoon. However, only a limited study was made of the spread of the various dengue serotypes throughout the country and additional refinement of the epidemiological surveillance is required. "Routine" entomological surveys using "visual inspection" were carried out in all states and divisions. No data, however, are presented on vector density or man/vector contact either of aquatic or adult stages, other than in the area of an insecticide trial which makes it difficult to judge the value, if any, of the inspections. Again, shortages of entomological staff precludes additional studies that should be initiated.

(b) Data Analysis

Basic Data Collected

Clinical malaria morbidity and mortality data, parasitological data and entomological data are collected for evaluation purposes.

Uses of Data

The data are compiled and analysed by respective VBDC team leaders. Effectiveness of control activities are analysed. Prioritization of problem areas are defined using a combination of matrix variables which are available at different levels.

Indicators used

The proportion of clinical malaria cases among the total out-patients and in-patients are used to evaluate the malaria morbidity in the drug control areas where it is not possible to collect other parasitological data. The case fatality rate among hospital in-patients due to clinical malaria are also used for evaluation of efficiency of case management and as well as to identify the reasons for high case fatality rates (CFR) in a particular institution.

Slide Positivity Rate (SPR) is used for measuring effectiveness of DDT spray in spray areas, with consideration given to an acceptable ABER in spray areas. Annual Parasite Incidence (API) is used for measuring the incidence of malaria and to determine the re-introduction of malaria in surveillance and vigilance areas.

Possible Biases

The proportion of clinically suspect cases (CSM) is a dependent variable and, in the case of outbreaks due to other diseases (e.g. influenza, P.U.O), this parameter can be affected. Inter and intraobserver variations in clinical diagnosis of malaria may also affect this parameter. The validity and reliability of CSM in relation to parasitological evidence shows about a 50 per cent positivity rate among those diagnosed as CSM.

SPR and API also depend on the ABER in relation to space and time coverage of the area collected.

Indicators to be used in future

CSM morbidity and mortality rates are used on a population basis in different strata, particularly in the Drug and Spray areas. The ABER will be increased in selected spray areas in relation to space and time coverage. SPR and API will be used in the spray, surveillance and (microscopic diagnosis of malaria cases and investigation) vigilance areas along with CSM. Entomological parameters will also be used for evaluation purposes along with epidemiological data.

(c) Control

- (1) There was little evidence to indicate that parasite and vector control measures were being more closely guided by the analysis of surveillance data. Surveillance information from development projects and notification of outbreaks resulted in some areas, in remedial measures being implemented. In most areas, routine measures were continued irrespective of the surveillance finding.

- (2) Numerous susceptibility tests have been carried out on vector and suspected vector species of anopheles to DDT, dieldrin, malathion and fenitrothion in various parts of the country. These are summarized in the "Situation Analysis 1976-1984".
- (3) i. Consequences of Vector Resistance to Insecticides
- Entomological investigations have identified malaria vectors in several areas. Many susceptibility tests have been performed. However, data correlating the presence of resistance to insecticides with epidemiological indices of malaria prevalence and transmission were not available.
- ii. Consequences of Malaria Parasite Resistance to Drugs
- In-vivo tests or resistance to chloroquine and to Fansider have been done. However, there are no attempts to correlate drug resistance with parameters of parasite transmission. Nevertheless, the Karen State appears to have more resistance than Sagaing Division and in-patient malaria morbidity is correspondingly greater (CSM of 24.0 per cent vs 14.26 per cent). The out-patient morbidity and the case fatality rate are similar in these two areas. Thus, drug resistance may have caused failure of out-patients therapy with a subsequent need for hospitalization.
- Furthermore, as seen during hospital visits, the problem of drug resistance has confused several clinicians about optimal therapy for falciparum malaria.
- (4) In view of the high level of DDT resistance of the primary vector of malaria in Rakkhins State and Sagaing Division a strong recommendation was made for field trials of alternative insecticides. It was reported that field trials were done with 3 insecticides. However, the tabular presentation reports the trials as having been carried out in 1981. Thus, the much needed trials of other and newer insecticides in areas of resistance have not been carried out in the period under review.
- (5) Until such time as a suitable vaccine is available for all serotypes of dengue the only means of preventing DHF is through ensuring a high level of the control of the vector Aedes aegypti. The recommendation to carry out a sequential ULV application of fenitrothion was fulfilled by a field trial in Rangoon which showed that some degree of control was obtained for up to two months. The evaluation techniques must be refined and data from an untreated area shown for comparison. As recommended, community participation was studied in one area but no data were presented on the results of the study.
- (6) In all vector control programmes sectoral cooperation is essential. This should be pursued both within and outside individual ministries involved.

Cooperation both within and outside the Ministry of Health has been sought, but with little results. Further consultations and efforts should be made to reach a satisfactory and efficient level of cooperation for the benefit of the project.

(7) Recommendation reformulated as follows:

Epidemiologic and entomologic parameters for all vector borne diseases should be scrutinized at Headquarters, State and Divisional levels. Afterwards, a specific and reasonable quantitative improvement in those same parameters should be targeted. To achieve the improvements, the appropriate control modalities were to be selected through a uniform process of decision making. Public Health personnel from Headquarters, the State or Division and the townships should participate in formulating the decisions. All pertinent data should be periodically re-evaluated to initiate appropriate changes in control modalities.

This is a vague and general recommendation. Again in 1985 there appears to be infrequent use of available information to modify the strategy for control of vector borne diseases. Nevertheless, several small epidemics of malaria have been investigated with subsequent changes in control modalities.

(d) Staffing and Training

Despite strong and repeated recommendations, the entomology section remains very much understaffed and no high level training has been undertaken for entomologists. This will be reviewed in greater detail under No. 5 of the Terms of Reference.

On the technical level, the VBDC has provided very considerable training of professional and primary health care workers from rural hospitals and rural health centres in short term courses. (See detailed tables in the 1983 Annual Report, pages 70-74, Tables T.1 and T.2) in the States and Divisions. These are continuing and will be expanded.

(e) Future Financing

The VBDC requires a detailed approved plan for the 1986-90 period which indicates the commitment and required external assistance. The VBDC has initiated such a draft plan, but much more work is required.

For the smooth continuity of the existing projects, official requests have been sent to representatives of Canada and Japan for uninterrupted financing of the present programme. The evaluation team of 1985 was expanded to include representatives of JICA and USAID with respect to recommendations for future financing.

5. Review of the Programme Implementation and Present Situation

The review by the team was greatly facilitated by the following documents:

- Annual Report 1983
- Situation Analysis 1976-84
- Report of the CIDA, Netherlands, WHO Evaluation 1984
- Various reports prepared at Divisional, Township and Rural Health Centre levels

The objectives of the VBDC project are to reduce the morbidity and mortality due to malaria and DHF and to reduce the morbidity due to bancroftian filariasis. The targets set and the achievements are in Annex V.

(a) Malaria

For the implementation of the malaria component of this project the country has been stratified into 5 strategic areas, i.e. drug area, spray area, surveillance area, vigilance area and originally malaria free areas. This stratification was based upon the malaria prevalence, accessibility, the epidemiological characteristics, vector bionomics, results of previous antimalaria activities, the development of the health infrastructure and the availability of resources. The key approaches are case detection and treatment, malaria chemoprophylaxis in high risk groups, anti-vector measures utilizing insecticides and environmental methods. An analysis of the malaria situation in these areas and for the country as a whole is presented in Annex IV.

Important ecological changes are taking place in the rural areas of Burma due to development projects such as dam construction and to clearance of forest areas for fuel and timber resources. The precise effect on the mosquito vectors is not known, but could be expected to reduce An. dirus but favour An. minimus. In addition population movements continue to be of major concern especially from the non or low endemic areas under vigilance or surveillance to the drug and spray areas. This makes epidemiological case investigation more important in the evaluation process.

Previous assessments had emphasized the need to increase the blood examination rate to improve the sensitivity of the evaluation parameters of slide positivity rate and malaria incidence. However, it is clear that the laboratory system is still unable to cope with the situation and that in some areas, such as those under spray, the ABER is far too high and in vigilance areas unnecessary active case detection is being practised. Provided the criteria for placing areas under vigilance is that there is no possibility of malaria transmission (absence of vectors) or it is very unlikely that transmission could occur (stable population)

then PCD alone should suffice. The implementation of the programme in the surveillance areas where there is both active and passive case detection seems to be rather rigid and a greater flexibility could be exercised. This is particularly so with regard to the frequency of ACD.

In the spray areas regular residual insecticide spraying could not be carried out in 1984 as planned due to the late arrival of the DDT supplies. This late arrival seems to have been the result of several factors related to the timing of ordering, the processing of the orders and in shipping and clearance procedures. Upon arrival late in 1984 the entire stock of DDT was sent out to the Township level where it is being stored under what appears to be adequate conditions in the one storeroom visited. Nevertheless, by using up some existing stocks of DDT, spraying was possible in 1516 villages covering a population of 828,102 out of the 4,872,000 people living in the spray areas in 1984. The consequence of this reduction in the area covered must be followed epidemiologically.

The implementation of the programme in the drug areas is difficult to assess but the statistics available indicate that there has been some effect on the malaria problem.

More data than on previous assessments was provided on the susceptibility status of the malaria vectors to DDT. Information was provided for 12 of the 14 States and Divisions. No information was available for Chin and Kayah. The main vectors An. minimus and An.dirus continue to be susceptible to DDT. However, little is known about their response to other compounds. The suggestion that An. minimus has changed its habits to become predominantly an outdoor biter must be viewed in association with changes in man's habits in becoming more active outdoors late into the evening. This can only be expected to increase relative to the availability of electricity and other social factors. In some areas and at some times of the year man sleeps outdoors or in houses with little sprayable surface.

An.annularis showed high levels of resistance to DDT in Rakkhine State and Sagaing Division. The mortality rate after exposure to 4.0 per cent DDT for 24 hours was only 31.6 per cent in Sittwe Township, Rakkhine State. In some parts of Rakkhine State An.annularis is the only vector, whereas in others it is secondary to An.sundiacus. It would be justified to consider changing the insecticide where An.annularis is the sole proven vector and to consider environmental modification in other areas where permanent drainage would considerably reduce the problem. There is a need to carefully examine the response of this species to alternative insecticides and methods. This has already been attempted on a small scale but needs to be extended.

Monitoring the response of P.falciparum to antimalaria drugs is the joint responsibility of the VBDC programme, the Department of Medical Research and the Army. There is no simple clinical monitoring or reporting of treatment failures. Ad hoc seven day in-vivo tests were carried out in seven selected areas in 1984 in Karen and Kachin States and in the Sagaing Division using chloroquine tablets supplied by WHO. The results were varied and indicated that in some areas of Sagaing Division the parasite is 100 per cent sensitive of RI resistant to chloroquine. In another area there was 11 per cent RIII resistance and total sensitivity to the sulfadoxine pyrimethamine combination. In Karen State the tests showed 18-33 per cent resistance to chloroquine at the RIII level and 14-40 per cent resistance to sulfadoxine pyrimethamine at the RIII level. The majority of the cases tested were either sensitive or resistant at the RI level to chloroquine to sulfadoxine/pyrimethamine and thus these drugs could be expected to continue to have a useful clinical and, in some cases, curative effect. However, the number of tests remain small in the very limited areas tested. Baseline information on the response of P.falciparum to mefloquine in-vitro has been collected by the Department of Medical Research. It is apparent that resistant P.falciparum occurs in most areas of Burma. However, the degree of resistance is by no means uniformly distributed.

The population under malaria chemoprophylaxis has been gradually increasing since this activity was introduced in 1979. The target population is one million but this number could not be covered as planned. In 1984, 322,000 people were protected using chloroquine. It should be pointed out that chemoprophylaxis should be confined to specialized groups, such as women in pregnancy and development project workers in high risk areas. Consideration should be given to the toxic effects of chloroquine on the retina due to the accumulation of the drug which is proportional to the total quantity consumed during life.

Concerning the use of antimalaria drugs in the programme and in the health facilities, clinically suspected cases are receiving 600 mg chloroquine as a presumptive treatment. Follow-up seems to be delayed or is not practised. No gametocytocide is in use for P.falciparum not even in sprayed areas. The management of severe malaria does not seem to be standardized and the use of quinine in the hospital system seems to be dangerously haphazard. Cases of blackwater fever were seen in 1984. There is an urgent need for a standard drug policy to be developed and implemented within the VBDC programme as well as the entire health services system.

There is much valuable information being collected by the programme. However, there was little evidence that this information was being utilized in a timely manner in the decision-making

process in regard to the implementation of control measures. Stratification is the key to the most effective use of the limited resources available and further microstratification will be essential. The existing VBDC stratification is not fine enough. An effective epidemiological response mechanism will be essential if the antimalaria activities are to be implemented according to the prevailing situation.

For the successful implementation of the programme it will be essential to have well trained personnel in various disciplines and at various levels of the health system. There continues to be only one fully qualified medical entomologist in the programme to cover all diseases not only malaria. An epidemiological capability will be essential at the Township level. The Township Health officers need to be trained in malaria, understand the national control strategy and study vector-borne disease epidemiology. Clinicians need to be informed in the latest methods of management of severe malaria if the increasing case fatality rate is to be reduced. The diagnostic capabilities (laboratory) within the programme but especially within the health services needs considerable improvement. Appropriate basic training and refresher training will be required. There is a need to develop a national VBDC capability to respond and implement long term training needs. There will, however, still be a need for a limited amount of external training at the masters level especially for medical entomologists pending the development of an appropriate degree course within the University system.

The Government has adopted the Primary Health Care strategy for the provision of health care to the periphery. Community health workers are being selected by the People's Councils to facilitate health activities within the community, to provide first aid and some treatment and to relay health information within the community. This is a part-time voluntary post. As an experiment in some areas, "Ten Household" workers are being selected to help the CHW. To date 14,000 CHWs have been trained. In urban areas CHWs are trained for prevention only and not treatment with the exception of the provision of oral rehydration salts as needed. The CHWs are trained to take blood smears and to provide chloroquine for clinically suspected malaria cases.

(b) Dengue Haemorrhagic Fever (DHF)

DHF first appeared in Burma in 1970, initially being confined to Rangoon city until 1975 when it spread to other States and Divisions. Since then cases have occurred in all parts of the country except Kayah and Chin States. The disease is cyclical with marked increases in cases every two or three years. The average number of cases per year is 2573.4 with 106.33 deaths and an average case fatality rate of 4.1 per cent for these 15 years. The highest number of cases occurred in 1975 (6,750) with 363 deaths and the lowest in 1973 (349) with 15 deaths. In 1984 there were 2,323 cases with 39 deaths compared with 2,856 cases and 83 deaths in 1983.

In 1984 Rangoon contributed the highest number of cases 1,773 (63 per cent) followed by Mon State with 218 cases (9.3 per cent) and Mandalay Division with 82 cases (3.5 per cent). Control measures such as source reduction involving the community, ULV spraying (fenitrothion), focal spraying around positive cases (malathion), larviciding with 1 per cent temephos sand granules applied to domestic water storage containers are all being carried out. Health education activities are conducted utilizing the mass media.

Mass serological surveys for various age groups among healthy individuals to establish dengue anti-body titres have been carried out. For diagnostic purposes paired sera were taken from 3,034 suspected DHF cases.

(c) Japanese Encephalitis

Japanese Encephalitis appeared for the first time in Burma in 1974 and from that time until 1979 there were 188 cases and 92 deaths. Since 1980 no cases have been reported from the country. Country-wide surveys of the distribution of the mosquito vectors are made on an ad hoc basis. In the known areas of previous cases portable space spraying machines and malathion are maintained to enable the VBDC team to take immediate action. Some vaccine is also in stock. During 1984, 507 health personnel including doctors, medical students, nurses, PHS I & II and WHO fellows were trained in the epidemiology and control of Japanese Encephalitis.

(d) Filariasis

In Burma filariasis is caused only by nocturnal Wuchereria bancrofti which is transmitted by culex fatigans (culex quinquefasciatus) which breeds in stagnant water created by poor environmental sanitation. Previously the disease was confined to urban areas but it has now spread slowly to the rural and hilly regions. Studies are being carried out on the epidemiology of the disease. Filariasis occurs more often in males than females. The age groups 15-19 and 20-24 have the highest reported incidence. Vector control using Fenthion 50 per cent E.C. at a target dosage of 0.5 ppm in water collections and drains is continuing. Studies on alternative insecticides have been carried out. Blood slide collections increased during the period 1979-84 (500,878) compared with the period before the VBDC project (79,908). The microfilaria carrier rates before and after the VBDC project were 2.4 per cent and 2.0 per cent respectively for the country. The vector is still susceptible to fenthion but there is some degree of tolerance now. There is no data on the incidence of clinical manifestation due to filariasis.

6. Case Finding Activities

(a) Malaria

Case detection may be clinical based upon signs (mainly fever) and symptoms (headache and chills) together with a history of exposure and parasitological, based upon the preparation, staining and examination of a thick blood smear. The results of both these activities are listed in Annex IV. In all areas both Active Case Detection (ACD) and Passive Case Detection (PCD) are practised. The former refers to house visiting by unipurpose or multipurpose health personnel to actively (on the part of the health services) seek out fever cases or those persons with a history of recent fever or exposure, for parasitological confirmation. PCD refers to the visit by the patient (passive on the part of health services), because of symptoms, to the community health worker or rural health centre and other fixed health facilities. In addition to these two routine case finding activities, there are on occasions special epidemiological surveys carried out by the VBDC Programme for special mass blood slide collections. This is particularly important in the surveillance areas where the re-establishment of malaria transmission and focal outbreaks could occur. Investigation and preventive action around introduced cases is important.

For the whole country the ratio of ACD/PCD was 1:1.15. ACD was higher in 6 States. Since the patient is seeking medical care because of illness the slide positivity rate is usually higher in PCD and is much more cost effective on the part of the health services. ACD is comparatively expensive and by necessity infrequent. It is usually conducted during Government working hours and therefore all the community residents are not present. The frequency of house visits should depend upon the amount of malaria, accessibility, the movement of populations and the proximity of the area to the spray or drug areas. The practice is governed by the availability of health personnel, their work load, attitude, mode of transportation and incentive. ACD is a malaria eradication tool for the purpose of detecting the last parasite carriers. Malaria control is focused on the disease which considers PCD more relevant.

In the VBDC programme the team found that ACD is being practised in the vigilance areas where there is no or very little malaria transmission and the population is virtually non-immune. Thus, PCD services should, if efficient, easily detect cases. It is important that there is the capability to recognize and treat malaria by the basic health services and PHC system. In the surveillance areas where malaria transmission

can easily be re-established it is important to prevent major outbreaks. There is a place for ACD but this would depend upon the risk of introduction of positive cases and the local prevalence of vector species. However, to be effective ACD would have to be frequent. There is a need to explore the relative effectiveness of house visiting by the health workers versus village visiting (two or three times weekly) to the CHW in support of the latter. In the areas under spray there seems little point in ACD to detect parasite carriers, especially when P.falciparum gametocytocides are not in general use. For evaluation purposes it is very easy to achieve an ABER of 10 per cent through PCD. In the drug areas only PCD sources are necessary (and possible). The reporting of clinically suspected malaria cases is important.

From the foregoing it is clear that PCD is the most important method of malaria case finding in a control programme. In this regard the team was disturbed by their observations in the field of paucity of laboratory diagnostic capability in the health facilities visited. The supplies and equipment needs to be improved, the laboratory management and supervision strengthened and the technicians need guidance, training and incentives to carry out malaria work in addition to their numerous other tasks. The laboratories in Rural Health Centres and Township hospitals play a vital role in the examination of blood smears collected by the CHW and various categories of health workers. If the case detection mechanism is to function at all, then the blood slide examination capabilities at these levels will need to be augmented. It is important that all health facilities to which severe cases of malaria are referred have laboratory diagnostic capabilities if the case fatality rate is to be reduced.

The team found that because the laboratories in these facilities did not have sufficient capability to examine routine malaria slides, the overflow sent to the VBDC programme overloaded the system and delayed the turn around time for the results to be transmitted to the PHC level.

(b) Dengue Haemorrhagic Fever

For the diagnosis of clinically suspected DHF cases paired sera are taken for antibody tests. Sera have been tested at the National Health Laboratory, Rangoon, the Mandalay General Hospital, the Department of Medical Research, the Rakkhine, Mon and Shan States General Hospitals and at the Bassein and Irrawaddy Divisional Hospitals. The team did not observe these tests being carried out. It is important to be able to type the virus.

Mass serological surveys using filter paper disc blood samples from various age groups continue to be taken from the healthy population to establish the dengue antibody titres among the population. The possibility of other flavi viruses causing cross reactions has been raised.

In 1984, 2,034 paired sera from clinically suspected cases were tested on 3,684 filter paper blood samples.

(c) Filariasis

Being nocturnal parasitological diagnosis was carried out from 1970 to 1975 by mass night blood surveys in 16 townships of one State and four Divisions involving 149,846 people of which 4,623 were positive for microfilarie. After receiving CIDA assistance it was possible to extend these surveys to all States and Divisions and, in the past 6 years 108 townships have been covered. A population of nearly 500,000 have been examined and 10,848 microfilaria cases were found among healthy people.

Research is being carried out on the use of provocative doses of diethyl carbamazine to enable daytime surveys to be conducted. The results to date are promising.

7. Insecticide usage, including environmental impact and resistance of mosquitoes

(a) Malaria

DDT is the only insecticide presently used in the malaria control programme in Burma.

DDT was applied once a year at the planned dosage of 2 gm (tech) per square metre and the spray timing was adjusted according to the transmission season of the area depending on the vector species.

In Burma , the main vectors in order of importance appear to be An.minimus An.dirus and in localized situations An.annularias and An.sundiaous and An.cul.cifacies.

The supply of DDT for the malaria control programme since 1966 ranged from a minimum of 30 metric tons during the years 1973-74 to a maximum of 450 metric tons during 1970-71.

However, the supply of DDT for the last four years (1980-84) was 250 metric tons per year.

The major vectors are still susceptible to DDT in most parts of the country. An.annularis showed a high level of resistance to DDT in Rakhine State and Sagaing Division. This species has also been selected for resistance to a lesser extent in three States/Divisions, i.e. Karen, Mandalay and Mon. An.culicifacies was found to be highly resistant to DDT in States/Divisions of Irrawaddy, Magwe, Mandalay, Pegu and Shan. Approximately 10 million people live within the area of its influence. Other anophelines which have been found to be resistant to DDT include An.nigerrimus, An.subpictus and An.vagus. However, none of these species are recognized vectors in Burma.

Decrease in susceptibility has also been observed in An.dirus in Mon State. An.annularis in Kachin, Rangoon and Shan and An.philipinensis in Mandalay and Sagaing.

The problem of resistance to DDT is mainly reflected in An.annularis in Rakhine State where malaria cases continue to be found in significant numbers and probably 1 million people live in the area of its influence.

Susceptibility tests have also been carried out on six anopheline species to the organophosphates, malathion and fenitrothion, and complete susceptibility was recorded in all tests. These include DDT resistant strains of An.annularis and An.culicifacies.

(b) Filariasis

The urban vector of filariasis, Culex quinquefasciatus, breeds in blocked drains, stagnant polluted water, septic tanks, cesspools and pit latrines. Its control has been practised over the past 20 years in townships in Rangoon Division by anti-larval measures using fenthion 50 per cent E.C.

The annual average consumption of fenthion for the years 1980-84 was 1247.5 litres or 49.6 drums. The average annual cost of Fenthion was US\$ 8,333.

Susceptibility tests to fenthion were carried out during 1984 on Culex quinquefasciatus larvae. These tests were carried out on larvae collected from 8 townships with different insecticidal pressure. Among these 8 townships, fenthion was used for 19 years in one township and 14 years in 7 townships. Results showed that there has been about 26 fold increase in the LC 50 of larvae from the area under spray for 19 years and between 4 and 18 fold increase in LC 50 of larvae in the areas under spray for 14 years.

(c) Dengue Haemorrhagic Fever (DHF)

Contingency measures for the control of DHF include focal spraying using malathion with a knapsack machine and at a radius of 100 meters around the house of the patient as a routine whenever a DHF case is reported. ULV block sprays were also carried out through truck mounted aerosol generator in the Rangoon Division when more than one case is reported. Malathion, 96 per cent technical grade was used.

ULV block spraying with fenitrothion L 40 S using a Leco truck mounted machine was also carried out in a limited area of Rangoon. Temephos, 1 per cent sand granules, have been applied in Moulmein City of Mon State since 1981.

Susceptibility tests carried out on larvae of A. Aegypti to malathion and Temephos and adults to malathion 5.0 per cent which showed complete susceptibility to these insecticides.

(d) Agriculture

The use of insecticides in agriculture has no doubt played a role in the development of insecticide resistance. It is of considerable concern that in Burma nine insecticides i.e. 4 chlorinated hydrocarbons, four organophosphorus compounds and one carbamate were used annually on various crops during 1977-1980. However, Burma at present is one of the lowest per acre consumers of pesticides in the world.

Development of resistance following extensive use of insecticides in agriculture, rather than in malaria, has been known to occur in other areas of the world. An example of this in Burma is seen in the case of A. culicifacies. This species is found mainly in the rice growing areas of Central Burma which entered the surveillance and vigilance phases of the antimalaria programme several years back and where residual DDT spraying of houses was withdrawn. The application of insecticides in agriculture, however, continue and is likely to be its cause of maintaining resistance in this species.

8. Review of Manpower Development and Career Structure Planning

The VBDC has outlined its detailed training requirements for the years 1987 to 1990! If implemented this training will be highly satisfactory. Recent and current training activities towards manpower development are reviewed in the 1983 Annual Report on pages 70 to 74 and in the "Situation Analysis" for 1984. These training activities are considered satisfactory as far as short courses of 1 to 5 days' duration. At the level of professional training of malariologists, epidemiologists and entomologists only in-service training is available and only a few long term courses in Burma or abroad have been undertaken. None of these courses were for entomologists and

this remains a severe deficiency in the programme. A 3 week WHO/DANIDA course in vector control will be held in Rangoon in April. In regard to career structure, most senior medical officer posts which have been sanctioned have been filled (though training of future staff, as noted above, is a matter of concern). Regarding entomologists and entomology related professional posts, sanctioned as long ago as 1974/75, 26 of the 37 professional posts related to entomology were still vacant (70 per cent) at the end of January 1985. (Situation Analysis page 13 and table 20). There is only one senior entomologist in VBDC but 4 entomologists posts were filled by promotion of assistant entomologists who have not received advanced training. It is understood that authorization has just been provided for filling all remaining vacant entomology posts as well as for sending two candidates abroad for M.Sc. degrees in medical entomology and vector control in 1985. In addition, the formation of professional training for entomologists in Burma will be begun at national universities.

9. The Present Effectiveness of the VBDC Project and its Potential for the Future

(a) Present Effectiveness of the VBDC Project

In general the VBDC has considerably improved its overall operational effectiveness during the 1983-1984 period with a marked increase in the surveillance coverage, an increase in training and an improved coordinated effort aimed at integration of services. It is recognized by the team that the epidemiological benchmarks of API, ABER, SPR may have questionable value in some areas. However, the information provided to the team indicates an improving trend in a number of situations. There were some areas of concern for the team of which the laboratory services were one. Improvement of the facilities and staff at the laboratories in Township Hospitals and Rural Health Centres is very important for the proper conduct of the VBDC program. The management procedures for the 1984 procurement of insecticides from external sources were not of a satisfactory standard. The loss of a total year's operation due to the lack of timely procurement of insecticides requires study and correction, so that a similar situation will not arise in the future.

The team recognizes that the VBDC in Burma is being integrated at the Township and Rural Health Centre level within the Primary Health Care system. According to the information provided to the team the integration will be completed by 1986. In such a reorganization, there will be many constraints and problems. The team felt that the national authorities have made progress in overcoming these problems and constraints within the available resources.

However, considering all areas as a whole there has been no appreciable change in the malaria morbidity, mortality or case fatality rates in the period before and after the implementation of the project. On the other hand, there has been an increase in the slide positivity

rate which could be expected from an increased annual blood examination rate. The relative ratio of P.falciparum to P.vivax has increased from a mean of 73.37 per cent +/- 6.75 per cent before the project to 83.92 per cent +/- 1.98 per cent during the project.

Considering the effectiveness of the VBDC project by stratum one may make the following observations:

(a) Vigilance areas:

The API has been significantly reduced in spite of an increase in the ABER. However, there is little evidence that the VBDC activities are of much value in these areas and activities should be confined to PCD case detection and treatment through the PHC strategy.

(b) Surveillance areas:

These areas are prone to outbreaks around imported cases and the VBDC surveillance activities such as case investigation and focal remedial measures should be effective. However, the annual parasite incidence (API) which has significantly increased during the past project period and this rise can be positively correlated with a significant increase with the ABER.

(c) Spray areas:

No significant difference has been observed in the SPR in these areas even though there has been a significant increase within ABER during 1980-1984. This could indicate that the VBDC activities are maintaining control at a certain level. In the Mandalay Division there is evidence that the antivector measures are having some impact, but the extent of which is not exactly known, since in 1984 there was no residential spraying and there has been a marked increase in malaria.

(d) Drug areas:

VBDC activities in these areas are difficult to evaluate. The statistics indicate an increase in the SPR, but this may be due to improved reporting during the period of the project implementation. The case fatality rate is higher but the percentage of clinically suspected malaria has been reduced during the period of the project.

A review of the specific vector borne diseases is general is as follows:

Malaria:

A 15 per cent reduction in the epidemiologic indices of malaria were expected between 1981 and 1984. A review of Table 30 in the Situation Analysis 1976-84 does not indicate such a reduction. There are even disturbing indications that the case fatality rate has increased, perhaps due to increasing resistance to chloroquine. The slide positive rate (SPR) for the whole country has decreased since 1981. However, it has not yet declined to the 1976 level. The collection of data in recent years is probably more thorough and it is therefore perhaps uninformative to compare the year 1984 with 1976. Although higher than 1976, the API has remained stable since 1981. The CSM has essentially remained stable in the outpatients departments. However, there has been a substantial increase in hospitalized malaria cases from 32,000 in 1981 to 38,000 in 1983. Thus, the overall epidemiologic pattern has been one of stable malaria prevalence and morbidity rather than a 15 per cent decrease.

Dengue Haemorrhagic Fever (DHF):

In comparison to 1983, the overall mortality and morbidity for DHF were slightly lower in 1984. The last epidemic was in 1975. Another epidemic would be expected. It has not yet occurred, perhaps through VBD control measures.

Filariasis:

There has been no reduction of the prevalence of microfilaremia in the younger age groups. Thus, transmission in 1984 was at least equal to transmission in 1980.

Japanese Encephalitis:

There has been no cases reported in recent years.

Conclusion:

The targets for the period 1981-84 have not been achieved. However, the epidemiologic indices for malaria and dengue are more or less stable and clearly do not show any deterioration.

(b) Potential of the VBDC in the future:

The VBDC is playing an important role in the control of malaria and vector borne diseases in Burma. It is essential that a national and State Divisional VBDC component be maintained and strengthened into

the next five year Plan in order to have national capabilities for policy development and planning, evaluation, technical expertise training and research activities in the field of vector borne disease control. It may also be necessary to have specialized VBDC units at certain townships to take on control measures in areas of high endemicity such as project sites and settlement areas. The integration of VBDC services within Burma should not follow one standard but be adapted to the epidemiological conditions of the particular townships. There are some areas of Burma where a more vertical structure for VBDC may have to be maintained for some years.

The Government Third People's Health Plan (1986-1990) includes malaria control as the first priority. The proposal for funding and manpower support for the program is considerable and indicates a national commitment to this complex program. However, the vector-borne diseases problem will not be totally solved over the Third Five Year Plan. The continued presence of a dynamic and technically responsive VBDC Unit at national and State/Divisional levels is seen by the team as an essential component of any national Primary Health Care system.

10. Programme Needs for External Collaboration

On reviewing the programme, there is little doubt that external collaboration is essential. The 1985 evaluation report will help orientate future external collaboration and it is necessary that the recommendations be included in the plan of the 1986-1990 period.

The efforts made to date in the various phases are excellent, but much more needs to be done in the individual phases. In the logistic support (DDT and equipment), the spray areas need detailed modification to reduce spray operations in some areas. The need to use epidemiological guides rather than markers for spraying is very evident. In the second phase, more emphasis will have to put on assistance within and outside the country. There is a lack of training in entomology, epidemiology and the refresher course for laboratory technicians, C.H.W. and A.M.W. are to be planned for future external collaborations. The third phase, clinical assistance, is going well and continued support must not fail.

If the activities are well implemented, they will constitute and contribute to the financial support of the VBDC in order to carry out the work.

There is a continued need for external support for commodities, equipment and transport. In order to approach donors for support, it is essential to prepare a detailed plan of operations (including priority list of commodities, equipment and transport) for the VBDC programme incorporating the revised strategies and approaches indicated in the recommendations of this evaluation mission. In order to do this activity, it is necessary to appoint a task force including national and international staff which should complete the work within six months (before October 1985).

Although the current CIDA project will terminate in April 1985, the unspent CIDA funds will enable WHO to purchase adequate insecticides and drugs for the VBDC programme for one year.

The unspent funds from the Netherlands could continue to support a WHO entomologist for a period of 2 years.

Thus, the preparation of a detailed plan of operation with revised strategies for the VBDC programme is an urgent necessity. WHO is prepared to facilitate this work in close consultation with Government and also actual and potential donors.

RECOMMENDATIONS OF THE REVIEW TEAM 17-27 FEBRUARY, 1985

I. ADMINISTRATION

1. In view of the top priority of malaria in PHP III the expertise of the VBDC programme from the centre to the township levels should be strengthened in all operational levels.
2. The VBDC through the Ministry of Health should make every effort towards more inter-sectoral coordination in the field of disease control. Development project financing should certainly include adequate funding for malaria control where it is known that the impact of the project will decrease malaria or other vector-borne diseases.
3. It is important to ensure the greatest possible coordination between groups involved in research on all aspects of the vector-borne diseases and to ensure their relevance to the VBDC programme for the control of these diseases.
4. Staffing at the township level should be sufficiently strong to enable the township health officer to carry out his many duties related to public health including the vector-borne diseases.
5. In order to ensure timely arrival of supplies and equipment to the VBDC, it is strongly recommended that a procurement schedule be developed and followed for each year. In the case of foreign source insecticides all procurement actions should be completed by October of the year preceding the actual operational year in which the insecticides are to be used.

II. OPERATIONS

1. In view of the limited resources available for surveillance and field control operations and the magnitude of the malaria problem, it is considered necessary to refine the stratification to enable resources to be applied according to priority.
2. The present system of data management within VBDC requires a complete study and review from its source at the PHC level to its central analysis. It is suggested that technical assistance be provided to a VBDC national data management committee which would review the present system as to its suitability and effectiveness and identify appropriate evaluation parameters. If a refined stratification is to be applied in the PHP III, this step will be essential.
3. Both to ensure the reliability of the data provided to the centre and, more important, to improve the reliability of case detection, laboratories at all levels must be strengthened by the provision of an adequate number of well trained and supervised technicians, suitable equipment and an improvement in the recording and relay of information by feedback to the primary health care level.

4. Malaria case fatality rates are rising; to deal with this rise requires rapid and accurate case diagnosis, awareness by health care workers of drug resistance, ensuring the availability of appropriate drugs, having a uniformity applied drug usage policy and by training in the laboratory diagnosis and clinical management of severe malaria. The practice of presumptive treatment with 600 mg chloroquine should be replaced by full treatment (1500 mg adult dose) of clinical cases. Primoquine single dose (30 mg - 45 mg adult dose) should be added as a P.falciparum gametocytocide especially in spray area.
5. To make the maximum use of limited resources ACD activities should be reviewed. Almost certainly this activity could be reduced in certain areas of the country such as vigilance areas.
6. The substantial number of water resources and other development projects and ensuing population movements have created areas of high risk to malaria. These areas should receive special attention both at the planning stage and even more so when construction has begun.
7. Vector control operations must be more closely guided by the results of studies on vector bionomics and insecticide susceptibility surveys. Close links between epidemiological surveillance and the planning of vector control operation are essential; in certain areas this may show that two applications of DDT at 2g/m² are necessary.
8. In areas where insecticide susceptibility tests and entomological studies show that it is still effective, DDT should remain the insecticide of choice against Anopheles vectors. It is, however, necessary to carry out large scale field trials with alternative chemical and biological agents and of environmental management to enable appropriate alternative insecticides to be selected if necessary.
9. Pesticide usage in the field must follow all appropriate safe use and environmental protection practices to protect spraymen, inhabitants and non-target organisms in areas under insecticide control. Improved storage and handling of insecticide is important as well as training in this entire area.
10. Improved practices for the control of Aedes aegypti, the vector of dengue/DHF, are essential. This should include more effective pesticide usage and greater use of community participation in preventing a vector breeding.
11. Despite a long standing vector control operation by larvicides prevalence of filariasis has not substantially declined. Greater efforts should be made towards the permanent elimination of breeding areas of the vector Culex quinquefasciatus by the construction of underground waste disposal systems.

III. STAFFING AND TRAINING

1. To ensure the effectiveness of the VBDC programme it is essential to fill by recruitment or promotion all sanctioned posts. The situation is particularly critical in the area of entomology. As indicated in earlier sections additional strengthening may be necessary in certain other areas.
2. To fill existing sanctioned VBDC posts and eventually provide replacements a long term training plan is imperative. This should include all levels of staff both at the centre, township and PHC levels.
3. Additional training in the epidemiology of the vector-borne diseases for township medical officers is required.
4. Inasmuch as no professional course in Medical Entomology and vector control exists at present in Burma, four candidates should be sent abroad for training at an M.Sc. level in this speciality. If sought, it is considered that fellowship funds are available. Placement of two M.Sc. candidates should be sought this year.
5. The capability of advanced training in medical entomology in Burma, perhaps as part of the MPH course, should be explored.
6. The present in-country short courses given by the VBDC should be continued and expanded. Particular attention should be given to the training of multipurpose health workers in VBDC. A high priority must be given to the training of laboratory technicians at all levels in VBDC work.
7. In view of the heavy existing and proposed training role of the VBDC it is necessary to improve all aspects of the training facilities and equipment, including the buildings. An on-going evaluation of the level of training should be carried out to ensure its effectiveness and appropriateness. The proceeding observations apply both to the centre and peripheral levels.

IV. RESEARCH

1. Special studies should be carried out in selected areas under different types of control to determine the effect of present control practices on vector borne disease transmission. The conclusions of such multidisciplinary studies involving epidemiologists, entomologists, behavioural scientists and other specialists should be used to adjust control practices as necessary.
2. Operational research should be continued on clinical monitoring of parasite resistance to drugs supported by in-vivo and in-vitro testing by well trained teams. This will help establish a unified drug usage policy.
3. Sero-epidemiological age-specific probe studies should be carried out both in surveillance and vigilance areas. This will guide decisions as to modifications of stratification.

4. With the eventual availability of trained entomologists, a number of applied field studies will have priority. These include studies on alternative control methodologies, field trials of new chemical and biological agents and observations on the effect of ecological changes at vector distribution and density. Studies on vector behaviour and host preference as related to man should be started.

V. EXTERNAL COLLABORATION

1. It is clear to the team that the VBDC programme will continue to require external funding for the provision of insecticides, drugs, equipment, transport and training. In addition, increased support will be necessary for external technical assistance and support for operational research.

2. However, if external assistance is to be sought and if obtained, fruitfully used, it is essential that a detailed plan of operation be elaborated specifying the changes that are necessary in the existing control program, the methodologies to achieve realistic targets and detailing the external and internal support necessary to achieve program objectives.

3. To prepare a detailed Plan of Operations, it will be necessary for a special team to be formed of both national and international members to examine the methods and approaches now in use, ascertain the constraints and impediments in the present programme and provide a new detailed plan of operations based on methodologies appropriate to the epidemiological and socio-economic conditions of the country. There is a considerable urgency in implementing this proposal as future external assistance may be conditional on the preparation of such a new approved plan of operations. It is proposed that the special team referred to above be formed as soon as possible and complete its work within six months. The WHO is prepared to facilitate the formation of a team and preparation of a plan of action in close consultation with the Government and existing and potential donors.

4. Already allocated and unspent funds from CIDA should enable the purchase of necessary insecticides and other supplies for the VBDC programme through 1985. Unspent funds from the Government of the Netherlands should be adequate to support a WHO entomologist for an additional two years and the team recommends these funds be used for this purpose.

It is clear that new external support and/or funding will be necessary by early 1986. Potential donors must be approached without delay. The completion of a new plan of operations including priority supplies and equipment will certainly be a prerequisite for any decision on new funding (other than in the area of external training for which new funds can be immediately sought).

Appreciation:

The team wishes to express its thanks to the Government of the Socialist Republic of the Union of Burma, the Deputy Minister of Health, Dr Tun Hla Pru, the Director General of Health, Dr U Tin U and the Director Disease Control, Dr U Kyaw Lwin, for facilitating their visit. Special thanks are due to Dr U. Nyunt Hlaing and his staff for their tremendous devotion, warm hospitality, and the extensive background documentation. The tasks of the evaluation team were greatly facilitated by the enthusiasm of the VBDC personnel through detailed preparations and many frank discussions. We would like to express our appreciation to Dr J. Galea, WHO Programme Coordinator and Representative for providing guidance, invaluable help, and gracious hospitality. Dr U Myint Htwe effectively acted as Liaison Officer and activity coordinator and the entire team thank him and express its appreciation for his constant efforts.

Thanks are also due to the many other staff members, too numerous to mention, of the Ministry of Health and particularly the VBDC programme who so greatly assisted the team in its discussions in Rangoon, Mandalay and the townships.

The team is extremely grateful to the typing staff of the WHO office, Rangoon, for their expert preparation of this report, and to Miss E. Callow, VBC, WHO, Geneva for her incorporations of all the corrections into the final version.

ANNEX I

Programme of CIDA/JICA/USAID/WHO Evaluation Team

17 February 1985 (Sunday)		Arrive Rangoon
18 February 1985 (Monday)	0800	Courtesy call on Dr U Tin U, Director-General Department of Health
	0830	Visit Helegu Township Hospital and Gyogone R.H.C. by car
19 February 1985 (Tuesday)	0900	Opening session and review of the VBDC programme at VBDC Headquarters, Rangoon
20 February 1985 (Wednesday)	0900	Continuing discussion on VBDC programme at VBDC, HQ
21 February 1985 (Thursday)	0645	Leave for Pegan, Nyaung Oo by plane. Visit Nyaung Oo Hospital and Taungzin Station Hospital. Night stop at Hyaung Co.
22 February 1985 (Friday)	0700	Leave for Mandalay by car, visit Popa R.H.C. and Magyitaing R.H.C. of Kyaukpadaun Town en route.
23 February 1985 (Saturday)	0700	Visit Rjinsa R.H.C. and Naymyo Township Hospital
24 February 1985	0800	Meeting with Divisional Health Director. Discussion at VBDC Mandalay
	1500	Leave for Rangoon by plane
25 February 1985 (Monday)	0800	Writing of report
	1500	Visit to Department of Medical Research
26 February 1985 (Tuesday)	0830	Preparation and review of report
27 February 1985 (Wednesday)	0900	Courtesy call on H.E. Dr U Tun Hla Pru, Deputy Minister for Health
	0930	Presentation of the report to the Director-General, Department of Health
27 and 28 February 1985		Depart Rangoon

ANNEX II

List of personnel met with:

Ministry of Health

Dr U Tun Hla Pru
Deputy Minister for Health

Dr U Tin U
Director General
Department of Health

Dr U Kyaw Lwin, Director (Disease Control)

Dr U Ba Tun, Director (Public Health)

Dr U Lun Wai, Director

Dr U Mehm Soe Myint, Director (Laboratories)

VBDC Headquarters, Rangoon

1. Dr U Nyunt Hlaing, Deputy Director (Malaria)
2. Dr France Tin, Malariologist
3. Dr U Myint Thein, Malariologist
4. Dr Daw May Kyi, Malariologist
5. Dr U Htain Win, Malariologist
6. Dr U Soe Aung, Specialist Medical Officer
7. Mr. Marcus Win, Senior Entomologist
8. Dr U Thein Tun, Assistant Malariologist
9. Dr U Myint Htwe, Assistant Malariologist
10. Dr U Zaw Than, Assistant Malariologist
11. Dr U May Aung Lin, Assistant Malariologist
12. Dr U Pyone Cho, Assistant Malariologist

HLEGU TRIP 18 February 1985

1. Dr U Kyaw Tint, Deputy Divisional Director, Rangoon Health Division
2. Dr Saw G. Aye Wai, TMO, Hlegu Township
3. Dr Douglas Dawson, Assistant Malariologist, Team Leader VBDC Team
Rangoon Health Division
4. Dr Daw Htay Htay Yee School Health Medical Officer, Hlegu Township
5. Dr Nu Nu Mu, School Health Medical Officer, Hlegu Township
6. U Tin Aye, Health Assistant, Gyogon, RHC
7. Say Bweh Paw, Midwife, Gyogon RHC
8. Ma Tin Ohn, Midwife, Gyogon, RHC
9. Naw Nyo Say, Midwife, Gyogon, RHC
10. Naw Paw Htco, Midwife, Gyogon RHC

ANNEX II (Cont'd)

PAGAN NYAUNG OO TRIP 21 February 1985

1. Dr U Kyaw Sein Divisional Health Director, Mandalay Division
2. Dr U Tin Htoot Township Medical Officer, Nyaung Co township
3. U Zaw Win Assistant Entomologist, Mandalay Division
4. U Ba Tu Secretary, Executive Committee People's Council
Mandalay Division

TAUNG ZIN STATION HOSPITAL

1. Dr U Win Mg Station Medical Officer
2. Daw Saw Myint Lady Health Visitor
3. Daw Taw Shin Midwife (Chauk kan)
4. Daw Ohn Kyi Midwife (Taung shae)
5. Daw Khin Yee Soe Midwife (Thaebwindaw)
6. Daw Khin Than Win Midwife (Chaung shae)
7. U Than Ngwe Public Health Supervisor I
8. U Than Nyunt Public Health Supervisor II
9. U Kyaw Than Public Health Supervisor II

HOSPITAL STAFF

10. Daw Kan Hme Staff Nurse
11. U Tin Oo Compounder
12. U Htay Aung Hospital Worker
13. U Aung Chin Hospital Worker
14. Daw Than Hla Hospital Worker
15. U Aung Maung Hospital Worker

KYAUKPADAUNT TOWNSHIP HOSPITAL - 22 February 1985

1. Dr U Myint Thein Township Health Officer
2. Dr U Maung Maung Dental Surgeon
3. Daw Kyaw Kyaw Khaing Staff Nurse
4. Daw Kyi Kyi Myaing Nurse
5. Daw Ohn Ohn Nurse
6. U Mg Mg Laboratory Assistant
7. U Htwe Compounder

MAGYIDAING RHC

1. U Khin Maung Health Assistant
2. Daw Kyi Kyi Lady Health Visitor

ANNEX II (Cont'd)

PYINSA RHC

1. U Chit Win Health Assistant
2. Daw Gay Yawn Lady Health Visitor
3. Daw Khin Myo Thein Midwife
4. U Kyaw Tint Vaccinator

MAYMYO TOWNSHIP HOSPITAL

23 February 1985

1. Dr U Soe Ya Township Medical Officer, Maymyo Township
2. Dr Aung Kyaw Oo Township Health Officer
3. Dr Daw Pye Nyein Medical Officer
4. Dr Aung San Go Medical Officer
5. U Nay Win Lab. technician
6. Daw Khin Thin Lab. technician
7. U Thin Tun Malaria Inspector
8. U Hla Shwe Malaria Supervisor

MANDALAY DIVISION VBDC

24 February 1985

1. Dr U Myint Swe Asst. Malariologist. Team Leader, VBDC Mandalay
2. U Than Maung Malaria Assistant
3. U Ba Kywe Malaria Inspector

ANNEX III

CIDA

1. Dr Pierre Heroux
Project Team Leader
CIDA Headquarters
Hull, Quebec
Canada

2. Dr Richard G. Lalonde
Department of Microbiology and Immunology
McGill University
3775 University Street
Montreal, Que
Canada H3A 2B4

JICA

3. Professor Hiroshi Tanaka
Department of Parasitology
Institute of Medical Science
The University of Tokyo
Minato-ku, Tokyo 108, Japan

USAID

4. Mr Lawrence T. Cowper
Office of Health -RP 703
Agency for International Development
Washington DC 20523

WHO

5. Dr Norman G. Gratz
Director, Division of Vector Biology and Control
WHO, Geneva

6. Dr P.F. Beales
Chief, Programming and Training
Malaria Action Programme
WHO HQ, Geneva

ANNEX III (Cont'd)

7. Dr K.M. Rashid
Senior Regional Adviser (Malaria & VBC)
WHO/SEARO, New Delhi
8. Dr M. Sathianathan
Chief, Planning Coordination and Information
WHO SEARO
New Delhi, India

WHO IN VBDC

9. Dr Jun Akiyama
WHO Entomologist
VBDC Project
c/o WHO
P.O. Box 14
Rangoon

VBDC

10. Dr U Nyunt Hlaing
Deputy Director (Malaria)

Liaison Officer

11. Dr U Myint Htwe
Medical Officer
VBDC, HQ

ANNEX IV

MALARIA PROFILE BURMA 1976-1984

	1976	1977	1978	1979	1980	1981	1982	1983	1984
Population (Thou) ¹	30,920	31,630	32,357	32,710	33,633	32,067	34,321	35,374	35,845
CSM ² outpatients (Thou)	515	562	356	414	729	775	773	930	560
CSM % outpatients	9.1	8.9	7.8	6.2	6.4	6.6	3.9	6.2	4.0
CSM inpatients(Thou)	42	46	39	55	100	94	104	102	109
CSM % inpatients	12.4	12.0	14.0	16.4	16.6	15.4	15.6	14.4	16.17
CSM deaths	707	936	917	1,282	2,120	2,045	1,980	2,217	3,097
Case fatality rate%	1.7	2.0	2.3	2.3	2.1	2.18	2.0	2.17	2.83
Annual Parasite Incidence %	0.48	0.65	0.69	0.63	1.2	1.4	1.4	1.35	1.69
Slide Positivity Rate (SPR) %	3.4	4.3	5.1	5.2	7.7	7.0	5.46	4.29	5.3
Annual Blood Examination Rate %	1.4	1.5	1.36	1.2	1.6	2.0	2.38	3.1	3.17
Slide Falciparum Rate %	2.36	2.93	3.8	4.3	6.3	5.8	4.5	3.68	4.59
Total Slide Positives	11,174	14,760	15,889	14,953	30,870	52,019	42,021	47,700	60,488
Total Blood smears collected (Thou)	318	345	313	285	452	606	1,201	1,134	1,137
P.falciparum/Pinvax ratio	2:1	2:1	3:1	5:1	5:1	5:1	5:1	6:1	6:1
SPR % Drug areas	2.39	2.5	5.28	4.14	11.8	12.18	10.77	9.9	12.29
ABER % Drug areas	0.5	0.5	0.47	0.54	0.7	1.25	1.6	2.18	2.3
SPR % Spray areas	4.78	6.28	6.57	8.3	8.2	9.1	7.3	6.6	7.75
ABER % Spray areas	1.86	1.73	1.57	1.8	3.8	4.1	4.5	4.73	5.20
SPR % Surveillance areas	1.9	3.1	2.1	2.4	4.8	3.66	2.8	2.2	2.78
ABER % Surveillance areas	1.42	1.72	1.47	1.12	1.2	2.2	2.5	3.55	3.49
SPR % Vigilance areas	6.3	5.6	16.7	16.28	13.2	2.1	0.4	0.5	0.68
ABER % Vigilance areas	0.45	0.43	0.42	0.26	0.4	0.6	2.16	3.30	3.30
Population Drug areas (Thou)	7,663	7,839	8,019	8,369	8,835	7,323	7,330	7,851	7,912
Population Spray areas (Thou)	6,497	6,647	6,800	5,324	4,696	4,405	4,633	4,829	4,872
Population Surveillance areas (Thou)	9,515	9,734	9,958	11,712	12,251	13,144	13,453	14,711	15,008
Population Vigilance areas (Thou)	5,043	5,160	5,278	4,330	4,629	4,514	4,628	4,935	4,999

¹Base census year 1973-28886

ANNEX V

ACHIEVEMENT OF MALARIA PROFILE REDUCTION OBJECTIVES

INDICES	BASE YEAR 1981	PLANNED TARGETS 1984	ACTUAL 1984
CSM ¹ % OP ² whole country	6.6	5.85	4.58
CMS % IP ³ whole country	15.4	13.66	16.17
CFR ⁴ % whole country	2.1	1.86	2.83
CFR % Drug area	2.3	2.04	4.03
SPR ⁵ % Spray area	9.1	8.07	7.75
API ⁶ % Surveillance area	0.8	0.71	0.97
API % Vigilance area	0.1	0.08	0.23

¹Clinically Suspected Malaria

²Outpatients

³Inpatients

⁴Case Fatality Rate

⁵Slide Positive Rate

⁶Annual Parasite Incidence per thousand population

ANNEX VI

RECOMMENDATIONS OF THE REVIEW TEAM - 1984

(a) Surveillance

1. It is essential to determine the actual level of malaria transmission in all phases of the programme. The team strongly recommends that this should be intensified in representative areas, where an accurate collection and analysis can be made of all essential surveillance parameters, viz: API, ABER, SPR, SFR, incidence of CSM, etc. In addition, samples of microscopically proven cases of P.falciparum should be subjected to case investigation to determine the site of transmission.
2. Increases in BER should be made judiciously and selectively; priority should be given to areas where changes in transmission are expected or in areas where active control operations are underway or planned.
3. The quantity of surveillance data collected from the field must be related to the capacity of all staff levels involved to accurately collect and process it.
4. Entomological studies should be an important component of all epidemiological studies; in sprayed areas these will determine the vector's response to insecticides and the consequent implications for control operation.
5. Ongoing field studies should be carried out on vector identity, distribution and density particularly in areas of ecological change and in areas in which insecticide control is considered.
6. In view of the recurring threat of dengue and dengue haemorrhagic fever in Rangoon and other urban centres of Burma, improved immunological, epidemiological, clinical and entomological surveillance is necessary.

(b) Data Analysis

1. The validity and accuracy of such parameters of measurement as CSM, laboratory diagnosis, vector and parasite identification etc., must be periodically evaluated. The question must be asked, do the parameters being measured truly reflect actual phenomena? As an example, what percentage of CSM as compared to non-CSM are in reality malaria?

(c) Control

1. Both parasite and vector control measures must be more closely guided by periodic analysis of surveillance data.
2. Vector insecticide susceptibility tests should be carried out in selected areas under insecticide control both for insecticides in use in the programme and those of potential use.
3. Where vector or parasite resistance has appeared, its consequences should also be determined in terms of disease transmission.
4. In view of the high level of resistance already seen in some vectors, high priority should be given to well planned insecticide field trials in geographical areas where alternative insecticides may be required.
5. Much room remains for improvement of Aedes aegypti control programmes and advantage should be taken of available knowledge for new methods and materials for control, e.g. sequential ULV, as well as of the renewed emphasis being given to integrated community control.
6. In all vector control programmes sectoral cooperation is essential. This should be pursued both within and outside individual ministries involved.
7. It is recommended that measurable operational targets be formulated for each State or Division and township to quantify control modalities. These should include projections for the implementation of regional decision making procedures on the basis of a continuing review of epidemiological data.

(d) Staffing and Training

1. While some shortages of staff have been relieved by the recruitment of new malariologists, the continuing shortage of trained professional entomological staff is especially dramatic and the team again recommends that efforts be made to remedy this situation.
2. Training of new entomological staff is of significant importance. Where it is not possible to do this through available fellowships to foreign universities, consideration should be given to setting up an intensive training programme within the country, for middle and senior level staff.

3. The integration of some VBDC field activities into the Primary Health Care programmes has been successfully initiated and is starting to pay off in increased coverage and efficiency. The team noted with satisfaction the establishment of VBDC training courses for PHC staff and recommends that these be continuously reviewed and updated.

(e) Future Financing

1. The team feels that the VBDC programme has reached a stage where, in order not to lose its gained momentum, its funding must not be allowed to falter. In view of the ending of present CIDA and Netherlands contracts, the team recommends that possibilities for future external funding be explored as a matter of urgency and early requests placed as appropriate with prospective donors.
2. For the sake of a smooth continuation of the programme the team recommends that a plan of action be drawn up in a programme planning meeting with present and future donors, early in 1985.
