INDONESIA

PROJECT PAPER

OUTER ISLAND MALARIA PROGRAM

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OUTER ISLAND MALARIA CONTROL

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GLOSSARY OF TERMS

Active Case Detection is a part of surveillance activities in which the formal malaria project actively searches for malaria cases through the collection of blood slides and epidemiological investigations.

Annual Parasite Incidence API is the proportion of cases of malaria detected on an annual basis in relation to the unit of population in which malaria occurs.

Biological Control is a method of controlling mosquitoes using living vertebrate or invertebrate predators, genetic control or parasites.

Chemoprophylaxis is drug prophylaxis which implies the use of drugs before infection with the aim of preventing disease.

DDT is an abbreviation of the common name Dichlorodiphenyl Trichloroethane, a chlorinated hydrocarbon type of residual insecticide.

Endemicity is a term applied to malaria when there is a constant measurable incidence both of cases and of natural transmission in an area over a succession of years.

Epidemic is a term applied to malaria when the incidence of cases in an area rises rapidly and markedly above its usual level.

Epidemiology in a broad sense is the study of the environmental, personal and other factors that determine the incidence of disease.

Falciparum Malaria is a severe type of malaria caused by Plasmodium falciparum, a species of malaria parasite.

Focal Spraying is residual insecticide house spraying around a malaria focus.

Malaria focus is a defined and circumscribed locality situated in a currently or formerly malarious areas and containing continuous or intermittent malaria transmission.

Incidence is the number of cases of disease occurring during a given time period in relation to the unit of population in which they occur.

Larvicide is a substance used to kill the aquatic larval stage of the malaria mosquito by ingestion, contact or respiratory blockage.

Malaria Control is an operation aimed at reducing the prevalance of malaria to a level at which it is no longer a major public health problem.

Malaria Eradicaiton is the ending of the transmission of malaria and the elimination of the reservior of infected cases in a campaign limited in time and

carried out to such a degree of perfection that when it comes to an end there is no resumption of transmission.

Malariogenic Potential is the degree to which an area is conducive to malaria based on cumulative epidemiological data collected from each area regarding the parasite load, vecotr density, water logging, climatic conditions, population movement and factors causing man made malaria.

Malathion is an organo phosphorus compound residual insecticide.

Malaria Parasite is a colloquial term for any of the protozoan organism causing malaria infections.

Parasite rate is the percentage of persons showing malaria parasites by blood smear examination.

Passive case detection is a part of the surveillance activities in which the public health and medical services other than the regularly constituted malaria service, assist surveillance activities by actively searching for malaria cases by the collection of blood slides and epidemiological investigations.

Presumptive treatment is intitial drug treatment given in a suspected malaria case at the time when a blood sample is taken for examination.

Residual insecticide is an insecticide which when suitably applied on a surface, maintains for considerable time its insecticidal activity by either contact or fumigant action.

Surveillance is that part of a malaria program aimed at the discovery, investigation and elimination of continuing transmission and the prevention and cure of infections.

Total spray coverage is the application of residual insecticide during one spraying cycle to all sprayable surfaces in all sprayable houses within a given operational area.

Ultra low volume (ULV) spraying is a method of insecticide dispersion by special air or ground equipment using very small amounts of finely dispersed particles of insecticide.

Vector in malaria is any species of mosquito in which the malaria parasite completes its sexual cycle in nature and which is thus able to transmit the disease.

Vector density is the number of female Anopheline mosquitoes in relation to the number of specified shelters or hosts or to a given time period specifying the method of collection.

Vector Susceptibility represents the degree to which a species of mosquito

develops resistance to the effects of insecticides.

Water management involves the reduction or elimination of sources of mosquito breeding through filling, draining, diking, changes in water level, flushing, canal trimming and other engineering methods.

PART I. SUMMARY AND RECOMMENDATIONS

A: Borrower and Implementing Agency

The Borrower will be the Government of Indonesia. The executing agency within the Government will be the Ministry of Health and within the Ministry, the Sub-directorate of Malaria Control.

B: Loan

1. Amount: Not to exceed $ 40.0 million (tranched $5.0 million in 1978; $10.0 million in 1979 and $ 25.0 million in 1980 for the remaining years of the program.

2. Terms: Payment within thirty (30) years from the first disbursement with a grace period on principal repayment of ten (10) years. Interest is payable in U.S. dollars at two (2) percent per annum during the grace period and three (3) percent thereafter on disbursed balance and unpaid interest.

C: Purpose

1. Further strengthen and expand the protection of the anti-malaria activities from the present priority areas of the Outer Islands to other malarious and priority areas of the Outer Islands.

2. Preserve gains, resolve problems and remove obstacles to effective malaria control on Java-Bali.

D: The Project

The project is a large scale five year effort to reduce malaria in (1) Java-Bali to an API of 1.7 per 1,000 in high incidence areas and to a parasite rate of 0.1% in low incidence areas and (2) to a parasite rate of 2.0% in the operational areas of the Outer Islands. The project has three major components: (1) a training and baseline data collection phase in the Outer Islands, (2) initiation of a spraying operation in the expanded Outer Islands program and, (3) support of major operational trials using insecticides other than DDT, 75%, wdp on Java-Bali in DDT-resistant An. aconitus areas. Program components to achieve these results include:

1. Epidemiological reconnaissance and surveys to obtain baseline data on malaria endemicity and vector distribution.

2. Spraying the vector resting places in rural areas with residual insecticides aimed at interrupting malaria transmission. Treatment of mosquito breeding areas will also be carried out on a limited basis.

3. Treatment of detected cases with anti-malaria drugs.

4. Establishment of three or more regional training centers and

schedules for training Outer Island personnel.

5. Applied field operation trials to provide epidemiological knowledge on malaria in Indonesia.

6. Health education to the public on the cause, methods of prevention, and activities of the mal ..a program. Community participation will be encouraged.

7. Evaluation of the program effectiveness through monthly reviews, reports, field observation and regularly scheduled external reviews and analysis.

E. Purpose of AID Assistance

1. AID loan funds will primarily finance the import of the residual insecticide DDT, 75% wdp, spraying equipment, anti-malaria drugs and vehicles for the Outer Islands over the five year project. Funds from AID-grant sources will provide technical services, training, support to operational field trials and consultant services.

U.S. DOLLAR ESTIMATES OF LOAN COMMODITY REQUIREMENTS

	1979	1980	1981-83	Total (000's)
Insecticides	3,057	4,472	26,131	33,660
Vehicles	1,332	429	331	2,092
Spraying Equipment	145	84	375	604
Anti-malaria Drugs	196	287	2,958	3,441
Other	160	18	25	203
	4,890	5,290	29,820	40,000

2. AID Grant funds are estimated at $4.0 million over the life of the project. The AID Grant budget is as follows:

U.S. DOLLAR ESTIMATES FOR GRANT FUNDING

FISCAL YEAR	1979	1980	1981	1982	1983	Total
Technicians (1)	200	200	740	700	700	2,540
Training (2)	70	70	160	160	160	620
Operational Trials(3)	105	105	105	85	85	485
Consultants (4)	15	20	30	35	35	135
Other	40	45	45	45	45	220
Total (in $1,000)	430	440	1,080	1,025	1,025	4,000

Grant funds are proposed for seven technicians as this support is not practical under the proposed loan. If the technicians were loan funded, the GOI would be faced with difficulties of salary levels and in preparing long term contracts using GOI criteria which may cause severe difficulties for for U.S. recruitment. Operational research is to encourage and is aimed

at innovative control-level responses to malaria problems. Training of senior staff in malaria control techniques is essential and off-island short term working and academic experience is required. Grant funds will provide support to this training as it would be difficult for GOI to support such non-academic training. Grant funds for evaluations and for consultants are required in order to preserve independence of technical expertise.

F. Beneficiaries

The beneficiaries of this project will be the majority poor who reside in the Outer Islands and who are severly affected by the disease of malaria. The program's impact will be especially favorable to infants and children in the 1-10 age group. In adults, the disease is debilitating and creates economic and social barriers to orderly development.

G. Other Donor Assistance

While AID is the primary donor in financial terms, this project does receive multilateral support. Other donors include Japan ($250,000 grant), World Bank ($226,000 in loans) and World Health Organization ($1,500,000 grant).

H. Issues

All issues relating to the project have been intergrated into the project design. A major issue concerning the reorganization of the Communicable Disease portion of the Ministry of Health has been discussed at length with the GOI and it is mutually understood that completion of such reorganization will be a Condition Precedent in the Loan.

I. Statutory Criteria

The projects meets all applicable statutory criteria.

J. Summary of Findings

The technical design, the cost estimates and prices of the project from the technical, financial, social, economic, and environmental aspects indicate the objectives will be met and will benefit the rural and majority poor populations of Indonesia.

K. Recommendation

1. That a loan of $40.0 million be approved to assist the Indonesian Malaria Control Program and that an initial tranche of $5.0 million be authorized for operational use in FY 1979.

2. That a grant of $4.0 million be approved to assist the Indonesian Malaria Control Program and that an initial grant of $500,000 be authorized for operational use in FY 1979.

PART II: PROJECT BACKGROUND AND DESCRIPTION

A. Background

1. Introduction:

Malaria has been identified as a major disease in Indonesia for centuries. The disease still persists in the nation and in many of the Outer Islands the disease is the number one health problem. In Java-Bali the disease has now been limited by the Government's malaria control activities to focal areas located mainly in central and eastern Java. The entire country of Indonesia is variably at risk to malaria transmission except for some mountainous areas above 4,000 feet. The size of the country. the variety of geographic and demographic conditions and the immensity and mobility of the population contribute to the enormous problem of malaria control in Indonesia. The effect of malaria is recognized as a deterrent to economic development and orderly social growth. Details of the demographic and geographic aspects of Indonesia are available in numerous reports and are not repeated in this project paper.

The first recorded malaria control activities in Indonesia began in 1919 with the establishment of malaria control units along the coastal areas which used larviciding and sanitary engineering techniques. Organized large scale anti-malaria efforts were started by the Government in Indonesia as early as 1924 with the establishment by the Dutch colonial government of a Central Malaria Bureau. A school for training malaria personnel opened in 1926. Malaria control through the period up to the early 1950's was largely restricted to source control and water management, larviciding and case treatment with quinine. In Java-Bali, after a successful demonstration project in Tjilatjap in Central Java in 1951, a large scale malaria control program was conducted from 1952-1958. This was followed by a malaria eradication program (MEP) from 1959-1965. By the year 1965 the MEP had reduced cases to less than 10,000 or approximately .125 per thousand population for all Java, Bali and Madura. This low case level was in sharp contrast to the more than 120,000 deaths and 30,000,000 cases which had been reported as occurring annually in Indonesia prior to the malaria activities.

The malaria control effort was disrupted in 1965 by a variety of political and economic changes. In 1967 the GOI reestablished the malaria program and placed the MEP under the Directorate of Communicable Disease Control. The early 1970's found the malaria situation continuing to deteriorate in areas which had been freed of the disease at great cost in money, materials, manpower and time and a total of 346,233 positive cases were reported in 1973 from Java-Bali. In 1973, renewed GOI efforts for malaria control which were assisted by a USAID Development loan of $24.8 million dollars began to lower the malaria case rates in Java-Bali-Madura and by 1977 malaria was limited mainly to specific areas. However, a comprehensive malaria program was not in place in the areas of greatest need - The Outer Islands. Gains in Java and Bali are also being threatened by importation of cases from Sumatra, Sulawesi

and Kalimantan. This project is designed to specifically assist that portion of the nation which faces the most severe malaria problem. The project is in accord with and essential to GOI aspirations for the maintenance of malaria gains on Java-Bali-Madura and for the development of the Outer Islands. The objectives of the National Health Plan give top priority to family planning and communicable diseases. Malaria control is the first priority of the CDC Directorate as evidenced by the allotment of 40% of its budget to malaria control.

The present malaria status of the population of Indonesia is as follows:

a)	non-malarious areas	6,805,000
b)	low risk of malaria	36,183,515
c)	high risk of malaria	44,542,118
d)	Outer Island population at risk	45,267,000
	TOTAL...	132,797,633

The project is consistent with AID's criteria for considering assistance to country malaria programs (A-733, dated July 3, 1973) as well as being in accord to the recommendations made by the Asia Bureau Malaria Study Group Report of November 1977.

2. Malaria Endemicity

Records prior to the establishment of a malaria control unit in the early 1950's are not available for the country as a whole.

In recent years available comparable data on malaria case incidence is confined mainly to Java-Bali. In reviewing this data the impact of the present program is demonstrated by the following summary:

Year	Population in Millions	Slides Examined	Number of Positives	SPR	API
1971	78.2	5655066	72829	1.28	0.90
1972	80.1	6715155	128830	1.92	1.61
1973	82.1	7386670	346233	4.70	4.21
1974	84.1	7519080	229693	3.05	2.73
1975	86.3	8289125	125166	1.51	1.45
1976	87.7	7859677	96999	1.23	1.11
1977*	89.5	6376726	88688	1.39	0.99

*Tentative data - about 95% complete (April 1978)

API - Annual Parasite Incidence

SPR - Slide Positivity Rate

The table indicates that the present program impact is resulting in the gradual reduction of cases as more specific attention is paid to the malaria problem areas in Central and Eastern Java. The program on Java-Bali has been stratified into high incidence and low incidence areas and activities planned on that basis. (See Annex 1).

In the Outer Islands comparable malariometric data which extends over such a time period is not available. However, general provincial data for Sumatra and Sulawesi indicate that parasite rates during initial surveys in the last five years run from 12.7% (Sumatra) to 14.9% (Sulawesi) with specific areas having rates of 30%-40% in some surveys. However, malaria is focal in nature and is modified by several factors. These factors include the amount of anti-malarial drugs readily available; existing medical facilities, local epidemiological conditions; and mobility of populations. In judging the occurrence of malaria epidemics among new transmigrants migrating to the Outer Islands, morbidity due to malaria has been as high as 75% with a mortality of up to 15% in those epidemic areas, i.e. Lampong.

The malaria problem in Indonesia is mainly limited in rural areas. Urban malaria is not a problem in Indonesia except for a few limited areas such as Jayapura, Irian Jaya. In cities elsewhere malaria is hypoendemic or is absent as is the case in Jakarta.

3. Malaria Parasites and Vectors

3a. Parasitology

The majority of malaria infections in Indonesia occur in the classic forms caused by Plasmodium vivax, P. falciparum, and P. malariae. Depending on the area the percentage of P. falciparum may vary between 14% to above 50% in Java-Bali. The P. falciparum rates are of great concern to the malaria program since this species has the most severe clinical effects and has greater potential for fatalities. Unfortunately, there are indications that strains of P. falciparum have developed tolerance and/or resistance to chloroquine in some of the Outer Island areas of Irian Jaya and Kalimantan. This drug resistance problem appears to be geographically limited, but will require continual study and evaluation. The population in areas with resistant/tolerant P. falciparum to chloroquine is:

East Kalimantan	809,685
Irian Jaya	1,019,305
	1,828,990

3b. Entomology

In Java and Bali, An. aconitus, is by far the most important vector by virtue of its widespread distribution. It is a rice field

breeder and rice cultivation is extensive in these islands. An. sundaicus, a brackish water breeder, is of secondary importance since its disappearance from the North Coast of Java in the early 1960s. Other anophelines incriminated in the past either by the presence of oocysts and/or sporozoites include An. subpictus, a widespread fresh or brackish water breeder normally associated with cattle; An. maculatus, a hilly foothill area mosquito, whose distribution is localized in Indonesia; An. nigerrimus, a swamp breeder which is widespread, but localized in nature; An. tessellatus, generally distributed although seldom abundant and prefers cattle; and An.vagus, which is strongly zoophilic.

In the Outer Islands all of the species found on Java and Bali have been incriminated in the past except for An. tessellatus on Sumatra. Additional anopheline species incriminated on Sumatra include An. leucosphyrus, An. barbirostris, An. annularis and An.sinensis (found in North Sumatra only). An. letifer is found only in Sumatra and Kalimantan. An. kochi, a muddy pool breeder which is highly zoophilic, has been identified. In Sulawesi, An. sundaicus and An. subpictus and recently An. barbirostris have been found to be more anthrophilic than elsewhere in Indonesia. In Maluku and Irian Jaya, the important vectors of malaria An. punctualatus, An. faranti and An. koliansis have been identified as well as An. bancrofti. An. balabasensis has a spotty distribution in Sumatra, Kalimantan and West Java.

In terms of status of susceptibility to insecticide, the important vector, An. aconitus, is resistant to dieldrin and has high tolerance to DDT in most of Central (25 regencies) and Western East Java (11 Regencies) and Yogyakarta. Elsewhere in Indonesia An. aconitus is considered susceptible to DDT, fenitrothion and malathion. Detailed data on entomology is found in Annex 1.

4. In-Depth Review and Situation Analysis of the Program

The status of the malaria program in Indonesia has been subject to two major external reviews since 1972 when a Joint GOI/USAID/WHO review recommended that USAID assist the Indonesia malaria effort through a Development Loan. The first major external review was held between July 12 - July 31, 1976; the second review was held between August 1 - 31, 1977. Both of these major reviews were organized by the Malaria Control Program with the assistance of external WHO and AID consultants. The recommendations made by both of these groups have been generally accepted by the GOI. The 1977 review provided specific recommendations on the establishment of the Outer Island Malaria Program (Pg. 11) and the GOI has been carrying out its development work for the Outer Islands with these recommendations in mind. (See Annex 1 for 1977 Review Report).

Regular and special meetings and workshops of provincial officers and headquarters are held by the Malaria Program for planning and to insure that the work is being properly carried out.

B. Project Description

The logical framework for this project is in Annex 4.

1. Plan of Operations

The malaria effort is now being conducted under an approved Plan of Operations which was signed between the Government of Indonesia and the World Health Organization in February, 1975. This plan provided the basis for the USAID Development Loan #497-A-034. An amendment to the Plan of Operations will be prepared for the Outer Islands as the details and data collected in March-May 1978 becomes compiled and summarized.

There are at present no specific formalized international principles and guidelines for planning national malaria control programs. The WHO has developed a position paper on a strategy for malaria control which will be submitted to the World Health Assembly in May, 1978. The planning of country malaria control programs is highly individualistic in character and the detailed standard planning approaches used for the time-limited malaria eradication efforts cannot be done. The intensive technical effort in March-May 1978 made in the Outer Islands to collect basic data indicates that flexibility, adaptations to local conditions, use of other methods outside of residual spraying, application of more self-help and community participation in malaria efforts and an increase in operational trials must play important roles in the proposed program in Indonesia.

The main purposes of the project are:

a) Further strengthen and expand the protection of anti-malaria activities from present priority areas (transmigration, high incidence, economically important areas) to other malarious and priority areas of the Outer Islands.

b) To preserve gains, resolve problems and remove obstacles to effective malaria control on Java-Bali.

The GOI has targetted in planning documents for PELITA III that the objective to be reached on Java-Bali by 1984 is to remove 90% of the malaria problem. This percentage will be achieved if in high incidence areas the annual parasite incidence (API) is 1.7 or lower and that in the low endemic areas a parasite rate of 0.1% is achieved. For the Outer Islands, the 1984 epidemiological target will be aimed at a parasite rate of 2.0% in those areas under the operational program. The accomplishment of these targets project that the population-at-risk (1984) will be 88 million people on Java-Bali and 47 million people on the Outer Islands of which 18 million on Java-Bali will be under spray protection. Approximately one-third of the total population (approx. 16.0 million) in the Outer Islands are now projected for spray operation

by 1984 with transmigration, areas of economic importance, and epidemic areas given priority. The GOI has projected that a population of approximately 110 million people will have access to drug treatment of which 41 million will be directly treated during this period. The anti-larval work is projected to rise from 5,000 hectares to 13,000 hectares by 1984. The U.S. AID project will assist the GOI in achieving this goal by providing supplies and equipment, training, research support and technical assistance.

The Government of Indonesia has given high budgetary support to the anti-malaria campaign in the past and is projecting a large investment in this activity over the life of the project. The table below indicates the yearly level of GOI proposed commitment in PELITA III * to the national malaria effort. (in $1,000's)

ITEM	1	2	3	4	5	
1. Wages, Incentives	5,727	6,474	7,056	7,238	7,837	34,332
2. Supplies	7,950	8,000	8,100	8,180	8,240	40,470
3. Equipment	2,570	687	687	687	687	5,318
4. All other Catagories (Handling, Construction, Travel, other)	5,657	4,257	4,682	4,543	4,521	23,660
TOTAL	21,904	19,418	20,515	20,648	21,285	103,780

The Budget breakdown is 66.62% of the budget for Java-Bali and 33.38% for the Outer Islands. (source: CDC/VBD-April 21, 1978)

The purpose of the loan is to provide imported commodities and supplies, training, limited research and technical assistance to support establishment of a malaria control mechanism which will assist the GOI to meet targets under PELITA III. The national government will be responsible for prompt commodity procurement, scheduling, delivery, control and proper storage of commodities at the field levels.

The amendment to the Plan of Operations for the Outer Islands will be distinctive in its organization as it will be aimed at a malaria control operation and not malaria eradication. Adequate malaria control in all the Outer Islands will take a number of years. This project is designed to begin this process and to support the GOI in its long term malaria control efforts.

*pELITA III - Indonesia's Third Five Year Plan

2. Detailed Description

a. Spraying Operations

1) Java-Bali

The majority of the spraying in Java-Bali will be carried out by the use of DDT, 75%, wettable dispersable powder (wdp), and is applied at a dosage of 2 and 1 gram/sq. meter. Normally 2 grams are applied in one cycle areas of seasonal transmission (West and East Java) and the one gram dosage in areas of perennial transmission to two spray cycles per year. The present spray rounds lasting 3-4 months are not considered satisfactory and the spray timing is to be shortened to one and a half to two months. Careful training of spraymen and supervisors is given in spray application techniques as well as in personal safety measures. Planning for the operations is done at the provincial level. Geographic reconnaissance is to be improved in the next PELITA period. As the vector of malaria in some portions of the Java-Bali area are resistant to DDT, the Malaria Program is planning extensive field trials using Fenitrothion. The project costs include funding the insecticides and supplies for these operational trials. The use of malathion has not been considered in Java-Bali against An. aconitus as small scale trials in the insecticide testing unit at Semarang have shown this insecticide to have limited effectiveness against DDT-resistant An. aconitus. The program has also planned to apply several different operational methodologies using DDT, i.e. technical DDT in coastal areas. Loan funds for procurement of DDT (technical) on Java-Bali will be limited to field trials which are mainly in An. sundaicus areas.

2) Outer Islands

The spraying operation in the Outer Islands will use the insecticide DDT, 75%, wdp in its spraying program. There is no plan to use other types of residual insecticides. The pattern of operation, spraying dosages, equipment will be similiar to the DDT operation on Java-Bali. Spray operations will be based on sound epidemiological data which will be gathered prior to the initiation of spraying. It is forecasted that widespread operations will not occur until the third year of the loan period. Operational trials will be carried out prior to massive spraying. Geographic reconnaissance will be done in operational areas prior to spraying.

b. Surveillance

1) Java-Bali

Active Case Detection (ACD) is to be continued in the Provinces of Java-Bali except DKI Jakarta during the project period. Surveillance agents cover a population of approximately 5,000 people and will be

supervised by a Surveillance Agent Chief. Coverage is to be done by monthly rounds. Health institutions are expected to participate in Passive Case Detection (PCD).

2) Outer Islands

Fever surveillance to screen malaria cases is now carried out by health institutions located in priority areas. Where feasible, these institutions also examine blood films of fever cases. Malaria surveys and investigations are also carried out particularly in priority areas, i.e. transmigration, high incidence areas. During the project period baseline data will be gathered through malariometric surveys using infant and child parasite rates, spleen rates, short and long term indicator area investigations, mass blood surveys. The parasitological data will be coordinated with entomological studies. The epidemiological findings of these two disciplines will form the basis for the operational planning and guide program decisions on the use of residual insecticides, application of other methods, and use of anti-malaria drugs either alone or in combination with other spraying or surveillance operational techniques. The strengthening of laboratory services will be a major element in the proper conduct of the epidemiological work.

c. Drug Treatment and Measures

1) Java-Bali

The drug treatment schedules used for presumptive, suppressive and radical treatment have been standardized for Java-Bali and reference is made to the report of the In-Depth Evaluation Team prepared August 1-31, 1977. The program does not plan to make major modification in its drug regime at this time over the life of the project. All treatments listed are given unsupervised except for the first dose of 4-aminoquinoline (chloroquine). There appears to be no chloroquine-resistance strains of malaria on Java-Bali but a number of investigations will be made during the project period to insure that the drug schedule is effective.

2) Outer Islands

Parasite positive cases as well as clinically diagnosed cases are given single dose suppressive treatment. Anti-malaria drugs will be widely used in the Outer Island program. The project expects to use a system of drug distribution centers using local village personnel especially in the areas identified for priority spraying. The organization of this village self-help system will be done early in the project period and pilot projects using this technique are being planned by the National Headquarters.

The appearance of chloroquine-resistance strains of malaria in East Kalimantan and Irian Jaya has caused concern and the Malaria Program will

maintain a careful vigilance on its spread. The degree of resistance where properly documented has shown the level of resistance to be at the R I level (or managable using increased dosages of chloroquine) except in one case of P. falciparum studied in a British biologist who acquired his infection in Irian Jaya which indicated an R III level of resistance.

d) Evaluation

The system of evaluation of the program both in Java-Bali and the Outer Islands will continue over the project period along similar lines as being done at present. Report forms and system will be modified where necessary for the Outer Islands. It is planned that more external assistance monitoring will occur in the actual operational period (3rd, 4th, 5th years) of the program. The U.S. AID plans to provide five malaria specialists to the Outer Islands effort during this period. In addition, there will be two USAID malaria officers at the national level - Malaria Advisor and a Public Health Administrator. - from the first year of the project. The national staff will provide additional operation officers, parasitologists, entomologists and administrators to supervise and provide evaluation of the project activities. Each province will be strengthened with personnel to carry out evaluation activities.

Internal program evaluations will be held on monthly basis at National Headquarters and at the Province levels. These meetings will review current status of the program effort and progress towards program targets. Annual meetings and workshops will be held with the Provinces by National Headquarters to review achievements and short falls and to plan for future activities.

It is planned that external reviews will be held during the second, third and fourth years of the project by a joint GOI/WHO/AID Situation Analysis or In-depth Review team to assist the program in its planning efforts.

The WHO is presently planning to provide technical assistance to the training effort by the provision of one more counterpart and a number of short-term consultants.

e) Research

Research in both the Outer Islands and Java-Bali areas will be limited to applied field trials against known program problems. Coordination with other research groups of the GOI and international agencies will be done. A list of projects was recommended by the 1977 Situation Analysis Team and plans are underway to carry out this work. Major emphasis will be on the application of other methods for malaria

control especially in the areas of water management, larviciding and biological agents. The other two major interest areas are in the application of different insecticides and drug treatment.

f) Training

Training is the core of the Outer Islands' Malaria Program expansion. It will be carried out in two phases: training of trainers and training of operational staff. Trainers will be sent to other countries, mainly in Asia and possibly in the Mid-East, in groups of three or four according to specialty. No observation or academic work is planned since all the trainers are already experienced technicians employed in the health services. Training will be carried out by work assignments in one or more countries for periods up to 3 months from January-October, 1979.

The training curriculum which will be prepared in 1978 will be reviewed and updated by the trainers on return from abroad.

The second phase of training, the training of staff, will begin with senior provincial malaria officials at three or more regional training centers, each staffed by an epidemiologist, entomologist, parasitologist and operations expert.

Each training center will include a work learning, model project area in an adjacent high endemic malarious area where students will carry out practical operations and evaluation activities in actual programs. Training of Senior Kabupaten staff medical officers and microscopists will be at the provincial level. Other official, paramedical staff and voluntary collaborators will be trained at the Regency levels.

g) Health Education

The health education efforts will be increased for the Outer Islands effort and much more stress will be placed on community participation in the malaria control work from the beginning of the project. Village level trials are being planned to determine the proper methodology for this effort. Key community leaders will be identified to assist in this effort. Village health councils/committees will be organized. Where mass media techniques can be used there will be an effort to use these methods, but the major efforts will be focused on village self-help methods. Limited health education equipment and supplies will be included in AID-source commodities procured under the loan.

h) Transport and Supplies

In Java-Bali the provision of vehicles will be based on fleet replacement. U.S. AID project funds will not be used for vehicle replacement or procurement for Java-Bali. In the Outer Islands, the vehicle procurement is based on what the Kabupatens and Provinces can

usefully use based on size of the Kabupaten and number of Kabupatens in the Province. The general planning calls for two vehicles at the Province level (jeep and pick-up) and at the Kabupaten. Wide use of light motorcycles as well as bicycles is planned.

The procurement of supplies for the project are focused on the Outer Islands. The major supplies will be insecticides, spraying equipment and drugs. The USAID procurement of supplies for the Jave-Bali will be limited to the cost of the insecticide, Fenitrothion, required for specific operational trials in high incidence areas in Central Java; DDT, technical, for trials in East Java and urban fringe spraying.

i) Other Methods

The principal attack measure in the Outer Islands will be intradomiciliary spraying mainly with DDT, 75%, wdp. In some cases, 100% technical DDT will be used in kerosene solution. Where ever feasable other methods will also be used to achieve maximum impact on the disease with minimum cost and to supplant or supplement DDT house spraying where vector resistance or other problems has lessened its value.

1) Java-Bali

The principal USAID supported activity on Java-Bali will be operational trials with the O.P. compound Fenitrothion in the DDT An. aconitus resistance area of Central Java. In addition, in a small refractory area of the southcoast of East Java, two Kabupatens will be studied for the effects of different formulation and intradomiciliary treatment regimens with DDT with and without supplementary larvaciding.

2) Outer Islands

In the Outer Islands, initial use of larviciding with diesel oil (and in less accessible areas with an O.P. compound Abate) will be supplemented by the use of source reduction and water management of lagoon breeding malaria vectors. In certain ditches adjacent to residences where Kankung, a leafy vegetable, is cultivated, Abate granules will be utilized to control anopheline larvae.

Operational trials are also planned for simple drug treatment of fever cases in community self-help projects in several areas, some with and some without supervision by agents of the Directorates of Health Education and Community Health.

Limited initial trials of the distribution of subsidized mosquito nets in areas of high malaria incidence may be followed by wider application if results prove satisfactory.

NOTE: Epidemiological, demographic, entomological data, provincial maps, project staffing, financial, commodity and training requirements, provincial growth and transmigration projections, planned operational areas and populations and all other background material used for the preparation of the Technical Analyses Section of the Project Paper "Outer Island Malaria Control" are compiled and available in the Indonesian USAID Library.

PART III - PROJECT ANALYSIS

A. Technical Feasibility

1. General

The USAID assistance to the program over the project period will be primarily aimed at efforts in the Outer Islands. The accomplishment of adequate malaria control in the Outer Islands is a long term activity and the present project can only be considered as a beginning to a larger effort which may continue for 20-25 years. The USAID inputs are being provided to strengthen the stated GOI policy to move more health services to Outer Island areas. The general plan for this expansion is ambitious and to accomplish the stated objectives will take money, manpower, materials and national commitment not only over the project period, but for years beyond. USAID, in considering this project, should determine whether long-term AID assistance beyond the present project period can be provided to the malaria effort in order to institutionalize the initial Outer Island malaria program activity. A Government/WHO/AID approved Plan of Operations will be a condition precedent prior to the disbursement of the first loan funds. Approved yearly Plans of Action will also be required prior to loan disbursements. These documents will have to be prepared realistically and in a sound technical basis with the long-term objectives on mind.

2. Technical Review

a) Objectives

1) Java-Bali

The objectives to reduce malaria over the five-year period in Java-Bali to (1) an API level of 1.7 in high incidence areas and (2) to a parasite rate of 0.1% in low incidence areas are considered technically feasible if the support elements proposed are provided on a timely basis and major technical problems do not arise; i.e. widespread resistance to either the insecticide of choice or the anti-malaria drug, chloroquine. It is expected that technical problems will not be a major obstacle over the project period.

2) Outer Islands

The reduction of malaria in the Outer Islands to a parasite rate of 2% or below in the areas of operation is considered to be technically possible, but difficult. The areas which are being undertaken are priority areas for malaria. Generally, these development or high incidence areas are being selected because they are more malarious. Based on available data most selected areas in Sumatra and Sulawesi will have an overall parasite rate in excess of 10-12%. Previous experience has shown that parasite rates in the areas do respond to spraying. As large areas under the project will have only received one or two cycles of

spraying by the 5th year, the overall SPR target of 2% may not be reached in all areas. The technical targets could be reached with proper staffing, adequate supervision proper spray application training and timely logistics. However, its achievement will be difficult with the rapid expansion of coverage from 2.5 million population now covered by some level of malaria control activity to the projected 16.0 million population under the proposed spray coverage in the project.

b) Training

The training effort projected in the program is ambitious, but all efforts will be made in creating trained staff to carry out the baseline and field operations. The plan to provide for three regional training teams for the Outer Islands will make the training target possible. One of the major roles of the Outer Island external technicians is to assist the training program. There is a lack of trained personnel in Outer Island areas and the project does focus major attention to this aspect of the program.

c) Community Participation and Health Education

The element of emphasizing more community participation and health education is in accord with present world-wide thinking on self-help activities in such programs as malaria control. The 1977 In-Depth Review Team Report listed as its first recommendation that community participation in malaria efforts be encouraged and supported. The adoption of known self-help methods by trials and pilot studies in Outer Island villages is planned and will provide guidelines as to how the system will work. All malaria personnel are instructed to carry out health education along with their other duties.

There is a Directorate of Community Health Education within the Ministry of Health and the malaria program draws upon this facility in its education activities.

d) Operational Field Trials

There is strong emphasis in the project for Operational Field Trials to test various operational techniques and to search for new or different methods of malaria control. The suggested field trials are considered adequate and reasonable for the program. It is foreseen that short-term consultants may be required on these operation trials. This area of the program appears understaffed and is in need of advisory and/or operating expert type of assistance if alternative measures of malaria control are to be developed.

e) Reliable Epidemiological Data

The malaria program does not presently have a qualified epidemiologist on its staff outside of the Program Director but the plans for creating this Post have been made. Epidemiological assessments are made by the senior malaria staff at Headquarters.

Epidemiological assessments over the period of the program will be based on (1) Passive Case Detection in health institutions; (2) Active Case Detection in Provincial Operations; (3) results of parasite and evaluation surveys; (4) special studies in focal epidemic areas. This data will provide an adequate information base for the epidemiological assessment of the program. The number of microscopists and laboratories will have to be increased. The program will provide one (1) microscopist for each 100,000 of population. It is planned that between 400-450 microscopists will be trained or re-trained over the five-year period. Approximately 150 microscopists will be trained in Year I of the project; 30-40 is Year II; 170 in Year III and the rest in Years IV and V. An additional 240 microscopes are scheduled for procurement during the project. The training of microscopists will be carried out at the Provincial level.

f) Adequate Maintenance of Transport, Spraying and Operational Equipment

In order that the residual spray program function effectively it is necessary that operational equipment be available and maintained.

Sprayers: The Indonesia malaria program uses the Hudson pressure sprayers. Spare parts are normally ordered from abroad, but some parts can be manufactured locally. There is no major problem foreseen on spraying equipment or related parts. Workshops for repair of sprayers will be organized on a Provincial basis. The program will procure 10% more sprayers than required for the operation in order to insure available equipment. Nozzle tips will be supplied on a 3-week usage basis.

Vehicles: The condition of the transport fleet is of great concern to the program. Vehicles are to be supplied to field units only after careful review of the needs of the specific area. Vehicle repair is now planned to be done on a commercial basis at the District or Provincial basis. The AID loan funds will only be used for boat motors, vehicle and motorcycle procurement for Outer Island requirements. The USAID loan does not include transport procurement for Java-Bali or any bicycles.

The current status of transport in the Outer Islands is as follows:

	Jeep	Inboard Motor	Outboard Motor	Motorcycles
Sumatra	13	4	5	116
Kalimantan	6	8	-	38
Sulawesi	6	1	16	52
Nusa Tenggara	3	-	14	31
Maluku	1	-	10	14

The projected transport requirements over the five-year period is as follows:

Year	Pick-Up	Jeep	Inboard Motor	Outboard Motor	Motorcycles	Carry-all
1979	61	68	15	15	90	6
1980	23	16	-	-	71	-
1981	10	21	15	15	29	-
1982	-	-	-	-	4	-
1983	-	-	-	-	6	2
	94	105	30	30	200	8

The addition of an Administrator on the USAID team over the life of the project is essential if a program of this magniture is to be efficiently operated.

The Government will also provide a Senior Transport Officer for the project to insure maintenance of the equipment.

3. Insecticide Situation

The program proposed to use the insecticides of DDT (technical and 75%, wdp) and Fenitrothion in its five-year program. The Outer Island program is expected to use only DDT. Limited amounts of Fenitrothion will be used in the DDT-resistance areas of Java-Bali only. The program will use the revised AID specifications for DDT procurement. As AID specifications are not available for Fenitrothion, the WHO specifications will be used as the base for procurement.

Presently, there is one major producer in the United States which can meet the USAID specifications and quantities required for DDT. The U.S. plant which formulates Fenitrothion (40%), has recently opened and its present status of production and suitability are not presently known.

The estimated amounts of insecticides required for the program (in metric tons) are:

	1979	1980	1981	1982	1983
Java-Bali					
DDT, Tech.	7	7	7	-	-
DDT, 75% *	3660	3660	3660	3660	3660
Fenitrothion (40%)	150	200	200	-	-
Fenitrothion (50%)	50	50	50	-	-

*Source: Funding estimates-CDC/VBD, April 21, 1978, using $1,600/MT.

Outer-Islands	1979	1980	1981	1982	1983	TOTAL
DDT, 75%	1150	1750	2950	4200	5250	15,300

This amount of insecticide is considered adequate by USAID for the planned spraying program. The malariologists from the Government and WHO agree that the use of the different insecticides is technically suitable for the planned program. In addition, the larvicide, Abate, may be procured for operations in coastal areas. The program will carry out training in handling insecticides and provide necessary protective equipment.

4. Conclusion

It is the conclusion of AID that the program planned is technically feasible and that objectives can be reached in Java-Bali. The achievement of program objectives will be more difficult, but technically feasible in the Outer Islands. The program schedules are very tight and the program, in general, is operationally ambitious. All program schedules must be maintained in order that effective operations can be instituted in a timely manner. However, it is essential to build a health infrastructure into the Outer Islands if this area is to be developed and fully utilized. This project provides the necessary assistance to the GOI to begin this long-term infrastructure development.

B. Financial Analysis

1. Alternative Sources of Financing

Other donors besides AID which are assisting the Indonesian Malaria Control Program are World Health Organization, the World Bank and the Japanese International Cooperation Administration.

It is important to note that the GOI provides the majority of the financial resources required for the program. For example, in 1979 and 1980 about 80% of the costs of the program are met with GOI funds. All local operating and approximately 50% of the commodity costs of the project are met with GOI funds.

Following is a summary of other donor assistance:

World Health Organization (WHO)

WHO estimates its contribution to the malaria program at $1,500,000 for the period from 1979 through 1983. The WHO assistance is in the form of fellowships short-term consultants and subsidy for holding international seminars and workshops. WHO also supplies test kits for the study of susceptibility of vectors. WHO proposes to provide technical assistance counterparts to the new national epidemiologist and entomologist as well as maintaining the present staff of malariologist (Team Leader),

epidemiologist and entomologist as technical advisors to the program. This WHO staff of five (5) members will be supplemented during the project by the SEARO/WHO engineering/operation advisor and other members of the WHO Regional Inter-country Advisory Team. In addition, the regional WHO office in New Delhi has a senior malariologist who has responsibility for monitoring the project for WHO. WHO also provides consultants who participate in the In-Depth and Situation Analysis reviews of the program and in specialized technical fields

Japanese International Cooperation Administration (JICA)

The Japanese International Cooperation Administration is providing the services of one professional entomologist to the malaria program at an estimated yearly cost of $40,000 per year. In addition, the JICA will provide approximately $560,000 for experts, training and commodities to the Health Ministry of which a part will be spent on malaria in two sub-districts.

World Bank (IBRD)

The World Bank has included in their loan proposals a sum of money for malaria operational costs in specific transmigration areas. The figure of $26 000 per year for the Bataraja transmigration area (South Sumatra) is an example of the level of funding. It is expected that similar sums will be allocated to the different transmigration areas.

2. Project Costs

The total costs of the program are difficult to estimate because of the scope and complexity of the activity, i.e. logistics in the Outer Islands, continued susceptibility of the vector to standard insecticides, level of community participation. It is, however, safe to say that over the life of the project the total costs would reach 150 million dollars. Because of the difficulty of projecting beyond a two year period, AID proposes limiting the initial development loan commitment to two years - 1979 and 1980. Program costs in these two years are estimated to be $27.6 million and $25.5 million respectively.

The major commodity components to these total program costs are insecticides, sprayers, vehicles and anti-malaria drugs. The AID loan will not provide for new or replacement vehicles, anti-malaria drugs or spraying equipment for Java-Bali. Insecticide procurement and other commodities under the loan is limited to Outer Island requirements and a portion of the commodities needed for the major operational trials on Java-Bali. In FY 1979, the total cost of insecticides, anti-malaria drugs, operational supplies and vehicles for $12.8 million or 46.5 percent of the 1979 program costs. Quantity and cost estimates for insecticides, operational supplies and vehicles scheduled for development loan support by AID for 1979 and 1980 presented

below are followed by detailed budget projections for the entire program. Budget estimates for 1981-83 are based on the amounts of commodities required to meet the GOI program objectives.

3. AID Loan Budget

The AID loan will finance approximately 50 percent of the insecticide requirement and about 28 percent of the overall program costs. The proposed AID budget for the AID loan is presented below. These planning estimates may change somewhat as the program progresses.

Estimated AID Loan Expenditures by Year

Item/Fiscal Year	1979	1980	1981-83	Total
DDT	2,057	3,222	24,881	30,160
Fenitrothion, 40% or 50%	1,000	1,250	1,250	3,500
Spraying Equipment/Parts	145	84	375	604
Vehicles/Motors Vehicle Parts	1,332	429	331	2,092
Anti-Malaria Drugs	196	287	2,958	3,441
Health Ed., Other-Lab,Office	160	18	25	203
TOTAL* (in $1,000's)	4,890	5,290	29,820	40,000

* Contingency and inflation added in costs above.

Alternative approaches to the level of the operational program were developed during the planning process. One alternative was to carry out the program on an eradication basis. This alternative would cost approximately 3 times as much as the proposed program and is considered unrealistic for Indonesia at the present time. The second alternative was to continue the existing malaria effort and expand into the Outer Islands at a rate consistent with transmigration and economic development. This approach would require almost the same basic personnel, but would serve less than 40% of the planned 16.0 million planned under this proposal. The cost effectiveness was considered to be not favorable to this option and technically it is difficult to operated a program effectively in small blocks of populations and across epidemiological stratus. A third alternative was a phased program approach where provinces would be taken in order on a schedule basis. This alternative did not meet with GOI approval.

4. AID-Grant Budget

The successful initiation and development of this project will require trained malaria specialists. In the 1977 In-Depth Review of the Outer Island activities, it was obvious that necessary technical skills to make the project viable are in short supply. To assist the GOI in its efforts to carry out the planned field effort and in training Indonesian technicians, seven (7) U.S. technicians are required as well as grant funds for research and training.

The budget below is prepared as the AID grant component to the project.

Fiscal Year	1979	1980	1981	1982	1983	Total
Technicians (1	200	200	740	700	700	2540
Training (2	70	70	160	160	160	620
Operational Trials (3	105	105	105	85	85	485
Consultants (4	15	20	30	35	35	135
Other (5	40	45	45	45	45	220
Total (in $1,000)	430	440	1,080	1,025	1,025	4,000

(1 - 1979-80 (two DH/PASA technicians); 1981-83 (five contract technicians). 1981 costs include $8,000 per contract employee for language and technical training in Oct/Dec, 1980. Costs include in-country perdiem and travel costs.

(2 - Costs in 1979-80 for Regional Center training staff at $8,000 per man for 16 officers. Costs (1981-83) 57 Headquarters and Provincial officers training outside Indonesia. All short-term training.

(3 - Includes $70,000 per year for pilot studies in community participation in malaria control; (2) $15,000 per year for external source equipment/supplies for six small scale field operational trials. $20,000 for East Java, technical DDT trials for three (3) years.

(4 - Based on $7,000 per consultant month.

(5 - Conferences, AID consultation, training, contingency, incentive pay for training staff.

5. Estimated Malaria Program Budget ($1,000)

		1979	1980	1981	1982	1983	Total
Commodity Costs (1							
	GOI	5,960	6,000	6,075	6,135	6,180	30,350
Insecticides	AID	3,056	4,472	6,329	8,635	11,167	33,659
Anti-Malaria	GOI	1,590	1,600	1,620	1,636	1,648	8,094
Drugs	AID	196	287	656	934	1,368	3,441
Vehicles/Parts	AID	1,332.3	429	296	28	7	2,092.3
Spraying Equipment/Parts	AID	145	84	221	81	73	604
Laboratory	AID	84.7	18.5	11	14	-	128.2
Other (Health Ed.	GOI	400	400	405	409	412	2,026
etc.) (2	AID	75.5	-	-	-	-	75.5
Agency Sub-Total	GOI	7,950	8,000	8,100	8,180	8,240	40,470
	AID	4,890	5,290	7,513	9,692	12,615	40,000
Sub-Total		12,840	13,290	15,613	17,872	20,855	80,470
Operating Costs							
National Overhead (MDH)		13,954	11,418	12,426	12,468	13,045	63,311
Ministry of Interior (Irian Jaya)*		40	40	40	40	40	200
WHO Specialists/ Training (Grant)		270	270	320	320	320	1,500
TA/Train/Research (Grant)	AID	430	440	1,080	1,025	1,025	4,000
World Bank		26	50	50	50	50	226
Japanese Int'l Coop. Admin. (JICA) (Grant)		50	50	50	50	50	250
Sub-Total		14,770	12,268	13,966	13,953	14,530	69,487
Total		27,610	25,558	29,579	31,825	35,385	149,957

* Ministry of Interior presently supports Irian Jaya malaria program. Long range projections for Irian Jaya will have to be worked out with that Ministry. Past inputs were approximately $40,000 per year and this figure was used as a base. UNDP assisted program with commodities until 1976, but does not do so now.

(1 - Source: CDC/VBD Table, April 28, 1978. Contingency/inflation included.

(2 - Includes GOI totals for all other commodities as breakdown not given - sprayers, vehicles, office, misc.

PART III C. SOCIAL SOUNDNESS ANALYSIS

I. Background: The Basic Malaria Control Program

Malaria is considered the foremost of the major diseases in Indonesia, especially in the Outer Islands, and its control is given priority in health measures by the Directorate General of Communicable Disease Control, Ministry of Health, Government of Indonesia, through its Malaria Control Program (MCP). This priority activity is strongly supported by USAID and the World Health Organization (WHO).

In recent years the incidence of malaria in Java and Bali has been kept within tolerable limits as evidenced by an annual Slide Positivity Ratio (SPR) around 2% in a country which was affected by rates around 30% before control measures were initiated (Report of a Joint GOI/USAID/WHO In-depth Evaluation of the Malaria Control Programme-Indonesia, 1977). Swift counteractive measures were taken to combat a rise in SPR in 1973 and 1974 and occasional localized outbreaks have been generally kept under control. Also while maintaining its vigilance and anti-malaria efforts in Java and Bali, the MCP has since 1970 begun to expand slightly into the Outer Islands (Table I). GOI realizes that combatting malaria requires long-term and continuous commitment.

TABLE I

Year Specific Expansion of Malaria Control Programme (Spraying of Houses) to the Outer Islands

YEAR	INDONESIA	OUTER ISLANDS		
	Total Number of Houses Sprayed	Number of Houses Sprayed	Percentage of Indo. Total	Number affected of 20 O.I. Provinces
1969/70	233,013	52,323	22.4	1
1970/71	1,738,232	108,602	6.2	5
1971/72	1,957,109	215,032	11.0	10
1972/73	2,366,514	352,832	14.9	14
1973/74	2,363,574	409,358	17.3	17
1974/75	2,193,790	409,118	18.7	19
1975/76	2,846,368	461,516	16.2	20
1976/77	5,114,701	562,656	11.0	20

Source:
Department of Health

The purpose of expansion into the Outer Islands is to contain malaria to the point where it will no longer be a public health problem;

more immediately, it is to directly protect 16,000,000 rural people and to reduce malaria incidence in target areas to 2%. Particular emphasis has been, and will be, placed on those areas with high priority, for example, foci of resettlement (transmigration), of high malaria incidence, and of economic and development activities as designated by GOI national and provincial planners. The major change in the present project is to include large areas under protection which are inhabited by indigenes of the Outer Islands.

II. Socio-Cultural Environment

A. Program Support System

Essentially the program is envisaged as a continuation of previous efforts to lower the disease nation-wide. While no fundamental changes are foreseen in its support system, some reorganization and considerable augmentation of the project will be necessitated by the controlled change in area focus. These include the establishment of more training centers for training staff for the program outside of Java and Bali, the recruitment of new, and retraining of old, personnel and a general strengthening of the support system for the Outer Islands. A cross-sectoral National Health Committee which sits periodically as a malaria committee to deal with malaria problems, has already been established; it is planned to establish counterpart organizations at the Provincial level for more effective coordination as the program physically widens its scope.

The ultimate responsibility of carrying-out anti-malaria operations lies with the medical officer of the sub-district (Kecamatan) health center. He works with the administrative head of the local government structure. This administrative arrangement prevails throughout Indonesia with slight variations dependent on local custom, population size and density, and extent of territory administered.

B. National Development Plans for the Outer Islands

The expansion of the MCP into the Outer Islands is consistent with plans for their development by the GOI. Considered below are three of the factors which support this thesis:

1) the availability of land;
2) the scarcity of labor; and
3) the incidence of malaria as an obstacle to GOI plans.

1. The Availability of Land

The Outer Islands are comprised of seven major island groupings; Sumatra, Kalimantan, Sulawesi, Maluku, Irian Jaya, West Nusatenggara and East Nusatenggara. Together they cover 93% of the total land area of

Indonesia (1,886,698 square kilometers out of 2,027,024) but are inhabited by only 37% of the total population (approximately 50,000,000 out of a total of 135,200,000 in 1976 according to the Statistical Pocketbook of Indonesia, 1977). Population densities, based on sub-district figures from the Department of Health, range from 2.5 persons per square kilometer in Irian Jaya to 122 in West Nusatenggara. Comparative densities for Java (excluding the city of Jakarta) are 645 and, for Bali, 427; the average for Indonesia is 70.

The low population density (and, by implication, the scarcity of labor) hinders exploitation of uncultivated land. There are also great limitations imposed by environmental and ecological factors. These include scattered populations, rugged terrain and the profusion of fauna which play a part in human disease. Yet it is significant that the bulk of forest land designated for development for productive use by GOI lies in the Outer Islands. Of a total of 501,700 square kilometers thus designated, 482,960 (96.3%) lie outside Java and Bali, principally in Kalimantan (259,100 sq. km), Sumatra (154,150 sq. km.) and Sulawesi (30,550 sq. km.). (Statistical Pocketbook of Indonesia, 1977). Irian Jaya is, as yet, barely considered by planners. Its forested area totals 315,000 sq. km. (76.3% of its land mass) and cultivation, including only 6 sq. km. of rice fields in 1976, is negligible. Only 5,900 sq. km. are under planning for productive use and only 100 families (out of a national total of 8,100 from Java, Bali and Lombok) were targetted for transmigration to Irian Jaya in 1975/76.

2. The Scarcity of Labor

Labor is needed to fulfill these plans for development. Transmigration of families from land-scarce areas, principally Java, is one answer to the problem of Outer Island development. An average of 7,300 families per year has been transmigrated between 1969 and 1975, and achievement of 85% of the target total. The third plan (1979-84), however, calls for 100,000 families to be transmigrated annually to the Outer Islands. Even if these ambitious figures are only partially achieved, the necessity to protect transmigrants from malaria is self-evident if the goals of national development are to be reached. The major development impact of the transmigration effort is expected to be subsequent spontaneous (voluntary) transmigration which experience has shown follows successful projects. This will only occur where health conditions are satisfactory, i.e. where malaria is kept under control.

3. Malaria Incidence in the Outer Islands

No firm figures are available on malaria morbidity and mortality for the Outer Islands. There are many indications, however, that morbidity may be as high as 75% among newly arrived transmigrants with occasional mortality rates as high as 15%. In those areas sprayed, the SPR * has been reduced from an average of 10.2% per annum to an average of 3.6%

* Slide Positivity Rate

(GOI/USAID/WHO Report). It can be inferred that malaria endemicity is generally high in the Outer Islands, but variable from area to area depending on environmental factors and ecological relationships. But whatever the degree of endemicity, malaria morbidity and mortality constitute a real obstacle to the development of the Outer Islands.

III. Social Consequences and Benefit Incidence

A. The GOI desire to develop the Outer Islands creates a favorable socio-cultural environment for the support of the Outer Islands Malaria Program. The fulfillment of GOI plans to use transmigration as a mechanism for national integration will provide more equitable employment opportunities and income distribution, increase agricultural and food production, and encourage more indentification of isolated areas with the mainstream of national development. An additional benefit may be the opening of new areas for income-producing tourism .

An adverse social consequence is that a sudden influx of large numbers of transmigrants into a given area may result in social tension, both among transmigrants themselves and between them and the original inhabitants. Tensions among transmigrants are those common to all pioneers who are opening new land and these can only be solved by the passage of time and by Government support and services (such as removing the threat of diseases). Even though the focus of transmigration is to open up uninhabited or sparsely inhabited land, conflicts sometimes arise over land rights, differing agricultural methods, differing customs and mutually unintelligible languages in areas where the indigenous peoples are relatively strongly entrenched or have a large settlement. In general, however, such conflicts are resolved, primarily, by a rise, in which the indigenous peoples share, in the economic conditions and improvement of infrastructure in the area, the growth of a common language (Bahasa Indonesia as the lingua francs), and the occasional intervention of local authorities.

Other problems are also caused by local envy of the food, shelter, medical care and educational facilities provided to transmigrants. Recognizing this, transmigration authorities try to forestall such problems by also providing benefits to indigenous families. These include, in some places, provision of identical homes for a similar number of local families. In other places, seeds and seedling plants are given to local residents who assist in development of the area by moving from other parts of the province to the area adjacent to the transmigration settlement. In almost all areas, local employment and access to the transmigration medical facilities constitute benefits which accrue to local residents and attenuate the tendency toward social conflict.

Transmigration has been going on at least since 1905 (though not on the scale envisaged for 1979/84) and experience has indicated a number

of other methods to ease social tension and facilitate adjustments by all parties concerned. These include careful placement of projects and enlisting wide support of local authorities. Further, limits are placed on the number of transmigrants to be settled in a given area (as in parts of Lampung in Southern Sumatra where transmigration was halted in the early 'seventies).

B. In common with many other countries that traditionally ascribe, or still ascribe, illness to supernatural causes, the Indonesians are very health conscious. There are usually three or four traditional curers (dukun) and midwives (dukun bayi) each in every village (desa) and an extensive use of folk pharmauceuticals. Indications are, however, that people seek out modern treatment if it is available. According to a 1972 household survey by the National Health Research Institute, out of 217 cases of malaria, 45% sought modern medical treatment and only 4%, indigenous treatment. The remainder were untreated (40%) or treated themselves (11%). There is, therefore, a receptive atmosphere to any active health program effectuated by GOI.

C. Further, one specific custom effectively supports the program. This is the relatively widespread use of mosquito-nets, even at the poor village level, whether or not the users are aware of the causal relationship between mosquito and malaria. In any case, people are aware of malaria as a specific disease by name and symptoms (and even with a specific traditional treatment to prevent its recurrence) and such awareness facilitates the execution of the program.

D. There is an important aspect to the role of the sprayman which goes beyond his spraying activities. He is local villager conversant with local custom and language which helps establish rapport between him as an agent of the program and the beneficiary. He is also issued information sheets enabling him to explain the purpose of the program to the people whose homes he sprays. Consideration could also be given to his being used in solving local problems which may arise from local cultural or ecological conditions. For example, in some parts of Indonesia, DDT spraying has affected the predator of larvae which attack thatched roofs; the sprayman could very well assist in educational efforts to convince the householder that it is better to repair a roof than to have serious illness in the home.

E. There is a hierarchy of socio-political institutions and people who can be mobilized to further the aims of the program. Among them are heads of villages (lurah), heads of sub-villages (kepala rukun kampung), heads of neighborhoods (kepala rukun tetangga) and heads of groups (kepala kilompok). Many of the units at the lower levels are based on kinship in Java and the framework and social relationships (if not the consanguineous relationships) have been reestablished in the Outer Islands by transmigrants. Additional resources are influential people (the good farmer, the teacher, the sage) and organizations such as social associations for women and village social development committees and

F. The reduction of malaria is necessary for the safe continuance of certain patterns of behavior which are integral to the maintenance of Indonesian rural way of life. These include:

1. The custom of farmers' sleeping in small huts to protect the crops in their fields, and of fishermen on beaches and near tidal flats.

2. The general mobility of rural Indonesians, not only on a daily basis to buy and sell at village markets or to visit relatives, but longer-lasting seasonal migrations in search of work (with nights often spent in communal shelters or "hostels").

3. The congregation of people at markets, koran readings, village shadow plays, rituals and other events.

4. The use of water in agriculture: irrigation canals, wet rice fields, fish-ponds, tidal water fish farms (which increase malaria incidence).

All these patterns of behavior are integral parts of the rural Indonesian's life and will have less adverse consequences to the health of rural people with the reduction of malaria.

G. Some social benefits may be inferred from the case of Lampung Province in Southern Sumatra. Where thirty years ago there were vast tracts of uninhabited forest, bush and swampland, there are now numerous flourishing settlements of 1,200 or more households each (the largest is close to 4,000 households). They are set among rice-fields, clove plantations and cassava fields; there is even a large palm-oil processing industry. Its population increased from 1.5 million in 1961 to 2.7 million in 1971 (National Censuses of 1961 and 1971); in fact, by 1971, it had achieved the status of a separate province. Of significance in social terms is that an imbalance in the ratio of sexes was gradually negated. In 1961 there were 934 females to every 1,000 males; ten years later there were 977. This indicates a more stablized and normal community life than was the case in the past.

IV. Beneficiaries

A. The Rural Poor

The vast majority of beneficiaries will be the rural poor of Indonesia since, in Indonesia, malaria is a rural rather than an urban disease. While daily wages for unskilled labor are generally higher in the Outer Islands (because of the scarcity of labor) than in Java or Bali, the average annual per capita income in 1976 was estimated to be $190.00 for all of Indonesia, $267.00 for urban people and $171.00 for rural (USAID/Indonesia, Annual Budget Submission, FY 1979). Taking into account world and Indonesian inflationary trends and a rupiah/dollar exchange rate unchanged since 1971, the rural poor very definitely fall below the poverty line of $150.00 set by the World Bank in 1974.

B. Women

Malaria affects all people irrespective of sex or age. Its control will, in one sense, however, benefit the economy more through its protection of women, since the economic importance of an Indonesian woman is very high is maintaining her household. Also a sick mother cannot care for her sick children. In rural Java, only 11.3% of male respondents, aged 20-59, could support through their sole efforts an "average-sized" family (Han R. Redmana, Hazel Moir and Daliyo, Labor Force and Labor Utilization in Selected Areas in Java, LEKNAS-LIPI, 1977). Whether or not this percentage can be applied to the Outer Islands is unknown; but even its doubling would result in a figure which would still underline the vital economic role of women. Women constitute a significant portion of the labor force (perhaps one-third in 1976) and their poor health would undoubtedly depress productivity levels. It may also be noted that the rate of participation in women in the labor force has risen from 32.8% in 1967 to 40.5% (of the women) in 1974 while the rate of participation in men over the same period has remained constant at 70% (of the men).

V. Conclusion

The Malaria Control Program is assessed as being socially sound because:

A. Socio-Cultural Compatibility

1. There exist a basic GOI administrative and operational framework through which the program can be executed.

2. Program objectives are consistent with, and supportive of, GOI national development objectives.

3. People are aware of malaria as a specific disease and not merely vaguely as a feverish condition. There are further conditions present which help the program.

a) the widespread use of mosquito-netting
b) the potential use of the sprayman as a basic educator of the malaria program; and
c) the presence of village-level institutions and influential people who can be mobilized to further the aims of the program.

B. Benefits

1. The program will protect those who are putting new land in production thus permitting an increased and more equitable distribution of employment opportunities, income and food.

2. The prevention of malaria will result in greater productivity among workers, a saving of food and, in the long run, less strain on the public health resources and system of a developing country.

3. The program will help preserve those patterns of behavior which are an integral part of rural Indonesian life.

4. Not the least of the benefits is the prevention of unnecessary physical and mental suffering among hundreds of thousands of men, women and children.

C. Beneficiaries

1. The beneficiaries are the rural poor of Indonesia, especially those who are pioneering into new land in the Outer Islands. The target is to protect 16,000,000 people.

2. Women as more economically important will be enabled to contribute more toward the social and economic life of their household and their community.

PART III

D. ECONOMIC ANALYSIS

Summary and Conclusions

The economic analysis reported below indicates that the proposed program of malaria control in the Outer Islands is marginally economically viable when evaluated on the basis of quantifiable economic benefits. Under assumptions which are intended to represent the most plausible operating conditions the benefit cost ratio, evaluated at a 15% discount rate, is 1.07 and the internal rate of return is 17%. The low benefit/cost ratio leaves little margin for inefficiency in program administration or deviation from the targeted schedule of population coverage. These results are primarily attributable to the high cost of program operations, which is caused by the low population density and consequently high cost of delivery in the Outer Islands.

Offsetting these results is the fact that, as with all health projects, a substantial part of the benefits are humanitarian but unquantifiable and have been omitted from the calculation of the benefit/cost ratio. In addition, it has not been possible to incorporate the benefits derived from the contribution that malaria control in the Outer Islands would make to the encouragement of transmigration. Nor has it been possible to include the benefits derived from reduced reintroduction of the disease, and thus lowered control costs, on Java-Bali-Madura. The importance of these omitted benefits in offsetting the results based on the quantifiable economic benefits is judgemental but potentially decisive.

The program would have large employment effects, providing directly for the training of 20,000 workers. Both the employment and benefits would be dispersed regionally and would have desirable income distributional effects. Malaria occurs disproportionately in agricultural families and the benefits would favor rural areas (See Annex 8).

I. Introduction

This analysis is intended to give an assessment of the economic merits of the proposed program of malaria control in the Outer Islands. The analysis cannot be considered a definitive study because of the lack of accurate data with regard to malaria incidence, fatality rates and health service usage in the Outer Islands. The parameters used in the analysis are judgemental and are based on the opinions of malariologists among the present evaluation team and consultation with Ministry of Health officials. The difficulties in conducting this analysis with the available data demonstrate the strong need for a baseline malariometric study, based on a stratified random sample of both high and low incidence areas in the Outer Islands, before sizable program expenditures are commenced. Such a study is being planned and will allow a firm basis upon which to evaluate program achievements.

The objective of the proposed program is to reduce the incidence of malaria in the total population of the Outer Islands from the estimated present incidence of .1 to a level of .02 over the five years of the program.

The program is comprised of two parts: 1) a spraying operation and 2) drug treatments for malaria. Benefits from spraying are derived from the prevention of morbidity and mortality. Benefits from treatments are derived from the reduced severity and duration of the disease through presumptive treatment as well as radical cures.

The incidence of malaria is unevenly distributed throughout the Outer Islands with pockets of very high incidence, thought to be much greater than .1, and other areas in which the incidence is low, probably below .02. The theory under which the proposed program was designed is that by concentrating the spraying operation on high incidence areas, with 16,000,000 in population, the incidence of malaria in the sprayed areas will be dramatically reduced and there will be substantial secondary effects from the reduced transmission of malaria to the remainder of the population. The predicted result is a reduction of the incidence of malaria in the total 50,000,000 population to .02. As the program expands over the five year planning horizon from an initial level of 3,750,000 to a final level of 16,000,000 the proportional effective coverage in the total population of 50,000,000 will expand accordingly as given in column (2) of Table 1[1]. The analysis in this paper rests fundamentally on the validity of these epidemiological assumptions underlying the program design.

We have omitted the proposed expenditures and thus the benefits from the malaria control operation in the DDT resistant areas of Banjarnegara on Java in order to obtain a better evaluation of the economic merits of the program in the Outer Islands which constitutes the bulk of the proposed project. With this omission the total cost of the Outer Island program, including GOI, AID and other contributions, is 28662×10^6 Rp. ($69.1 million) using 1978 prices.

II. Cost Benefit Analysis

It is widely recognized that cost benefit analysis is difficult to apply to health projects because, although the costs are usually concrete, a substantial proportion of the benefits are intangible. In the present study the intangible benefits include the incalculable value of life and the value of reduced suffering to the person whose illness is prevented and the avoidance of the suffering bereavement and anxiety of friends and family. The importance of intangible benefits makes it infeasible to compare the results of a cost-benefit analysis in the health sector with the results of analyses of projects in other sectors of the economy. Nevertheless, an analysis based only on the tangible and quantifiable benefits of a health project is useful since it forces recognition of a class of benefits - the direct economic benefits - which might otherwise be overlooked. In addition, although difficulties still remain, the results of the analysis might provide some guidance in the comparison of projects within the health sector.

A. Economic Costs

The economic costs are the incremental project costs less the value of capital remaining at the end of the planning period. The costs represent the sum of expenditures from all sources and have been derived from the financial flow

[1] Tables 1-7 are included in the Appendix

tables after subtracting a 5% per annum inflation factor and the cost of expenditures on Java and Bali. The costs, in terms of 1978 prices, are given in Table 2.[1]

The foreign exchange component of project costs has been converted to rupiahs at the current exchange rate ($1 = 414.5 Rp.). It is plausible to argue that this rate significantly overvalues the rupiah, perhaps by 15-25%. Although illegal markets for foreign exchange do not exist in Indonesia, the demand greatly exceeds the supply of import licenses at the current exchange rate. Nevertheless the rupiah is, at present, freely convertible and there appears to be no imminent possibility of devaluation. Rather than make an arbitrary choice of a shadow exchange rate we feel that it is less misleading to use the current exchange rate but to remain aware that actual cost may be underestimated by 10-20%.

An estimate of the cost effectiveness of the proposed program can be obtained by using the population data, and the estimates of the number of cases and deaths prevented, shown in Table 1, together with the cost information on Table 2. The total cost of the program per person in the Outer Islands (1981 population) is 512 Rp. ($1.23) over the five years of the program or 102 Rp. ($ .25) per person per project year. The estimated average cost per case prevented or treated[2] is 1,841 Rp. ($4.44). The estimated average cost per death prevented is 2,006,692 Rp. ($4,841.24).

Since the initial program coverage is small, although capital expenses and start up costs are large, we have also examined the cost effectiveness of the final year of the program in order to obtain an indication of the effectiveness of continuing the program beyond the initial start up period. The actual cost of 1983 operations, including an addition for depreciation on capital accumulated in prior years less the value of current investments, is 7984×10^6 Rp. The total cost of operations in the fifth year per person in the outer islands in 1983 is 147 Rp. ($ .36). The estimated average cost per case prevented or treated is 1,036 Rp. ($3.95). The estimated average cost per death prevented is 1,732,262 Rp. ($4,179.16).

B. Economic Benefits

For the present study the economic benefits from malaria control include the avoidance of income lost from morbidity, the avoidance of the extra caloric intake associated with malaria morbidity, the avoidance of treatment costs, the avoidance of lost income through premature death and the value of avoided time in the care of the sick.

[1]Tables 1-7 are included in the annex to the project paper.

[2]Over the five years of the program there will be an estimated total of 12,000,000 cases prevented, 2,400,000 malaria cases treated and 13,290 deaths prevented.

a. Avoided Income Loss from Morbidity

Income (or production) to society is lost when members of the labor force are prevented from working or when at work they are less efficient due to malaria. In the present study, we attempt to measure only the lost output from lost work days due to malaria in the labor force. We have assumed the rate of unemployment is nine (9) percent and have subtracted out the unemployed from the labor force estimates. In addition, we have assumed that the rate of underemployment is thirty percent of the labor force and that the shadow wage, or value of output per day lost to illness, for the underemployed is fifty percent of the real wage for the fully employed[1].

b. Avoidance of Extra Caloric Intake

Individuals suffering from a febrile disease require extra calories. For malaria the excess caloric requirement is 400 kilo calories or 100 grams of carbohydrates per day for the duration of the attack. We have valued this at 20 Rp. per day[2].

c. Avoidance of Treatment Costs

The treatment costs include the cost of treatment by traditional means[3] (Jamu medicine) as well as medical care received through self treatment with conventional drugs, outpatient clinics or hospitalization These costs represent an allocation of resources that would be unnecessary in the absence of malaria[3].

d. Value of Income Received from Prevented Mortality

The discounted value of the expected stream of lifetime earnings gives an estimate of the present value of the stream of output lost through the premature death of an individual. We have based our calculation on an estimate[4] of the present average per annum income of 80,000 Rp. and an assumption of a 4% annual increase in productivity. By using the national average income, an adjustment is implicitly made for the possibility of unemployment and underemployment. That is, the assumption is that infection is approximately random and a person whose death is prevented by malaria control may be unemployed, underemployed or fully employed with probabilities that are reflected by the present distribution of income. This somewhat overestimates the value of this benefit since malaria rates are probably higher in rural lower income groups for whom exposure is greater.

[1] For further discussion of this point see GOI/AID/WHO, In Depth....., Economic Analysis, pg. 88-89.

[2] Source: GOI/AID/WHO, In Depth ....., Economic Analysis, pg. 100.

[3] A 1976 study of the marketing and consumption of jamu medicine indicated that 70-75% of respondents would use jamu for medication irrespective of whether or not modern medical care is also received. O. Roesnadi, W. Tahar, I. Anwar, Report on Marketing and Consumption of Jamu, P.T. Inscore, Indonesia, 1977, pp. 16-17.

[4] AID/Indonesia, Annex to Annual Budget Submission FY 1979.

e. Value of Time Spent in Home Care

The inclusion of this benefit recognizes the economic role of women in the agricultural household. Over a calendar year, the marginal product of both male and female labor may remain substantial throughout the busy season. In the slack season off farm employment opportunities may exist for men but are often limited for women, as a consequence the marginal value of female labor time falls severely. In the calculations used to derive the value of time in home care, we have assumed that, given the two crop cycles in Indonesia, the busy season comprises approximately one-fourth of the calendar year.

Based on the results of a labor force participation survey we have evaluated female labor time at a shadow wage of one half the average wage during the busy season and one fourth of the average wage during the slack season[1]. Assuming that the disease occurs randomly over the calendar year (this probably provides an underestimate of this benefit since malaria is more prevalent in the busy season) the value of female time spent in care is .3125 times the average real wage[2].

The calculated values of the benefits under alternative assumptions of six and eight days duration of illness per case are given in Table 5 (Appendix .

C. Results of the Cost-Benefit Analysis

Three cost-benefit analyses are conducted. A discount rate of 15% is used[3].

1. An analysis is made over the span of the five year program with the benefits evaluated under the assumption that the average duration of illness used in the calculation of avoided income lost, avoided time in care and so on, is six days per case (See Part A of Table 5). This assumption is used because it provides a comparison with the cost benefit analysis of a hypothetical malaria program for the Outer Islands conducted in the GOI/AID/WHO In-Depth Review of August, 1977. The 1977 study found that a 2075 x 10^6 Rp. ($50 million) program evaluated over a five year program span would have a benefit/cost ratio of 1.63 and an internal rate of return (IRR) of more than 50%. In contrast the results for the present program, summarized in Table 6, are a benefit/cost ratio of .92 and an IRR of -4%. This is true in spite of the use of slightly higher prices and wages and the addition of two more benefit categories (avoided mortality and avoided family care) in the present analysis.

[1] The activity rates for females are approximately .5 during the busy season and .25 - .30 during the slack season. See H. Rehmana, H. Noir and Baliyo, Labor Force and Labor Force Utilization in Selected Areas in Java: vol. 1, National Institute of Economic and Social Research, Indonesia, 1977, p. 77.

[2] (1/2 . 1/4 + 1/4 . 3/4) = .3125

[3] A discount rate of 15-18% has been used in other recent cost benefit studies in Indonesia. This range appears to approximate the present opportunity cost of capital in Indonesia.

In order of importance the major reasons for this divergence are:

i) The present proposed program is 38% more costly than the program considered in the 1977 analysis.

ii) It was assumed in the hypothetical program considered in the 1977 analysis that the incidence of malaria would be reduced to the control level in the entire population from the first year of the program whereas we have assumed that the control level is reached in a proportion of the total population that grows over the five years of the project in accordance with the planned growth in program coverage.

iii) The 1977 analysis assumed a reduction in malaria incidence to .01 whereas the present analysis uses the target rate of .02.

2. An argument can be made that six days is an overly conservative estimate of the number of days lost to an attack of malaria. The actual average may be greater due to increased susceptibility to other diseases and recurrent attacks. To test the sensitivity of the analysis to the duration of illness assumption we have calculated the benefits using eight days as an alternative, and we feel a more reasonable, estimate. The results of the analysis using the alternative assumptions are given in Table 7 which shows a benefit/cost ratio of 1.16 and an IRR of 25%. Thus the change in the assumption changes the results from an unfavorable benefit/cost ratio of less than one to a more favorable value somewhat greater than one, and we conclude that the analysis is highly sensitive to the assumption regarding the duration of illness.

3. In the final cost-benefit comparison we have kept the eight day duration assumption but have made two changes in the analysis which are intended to provide a more accurate description of the actual flow of costs and benefits under which the program should be evaluated. First we feel that it is erroneous to evaluate the program on the basis of only the initial five years since these years include substantial start up costs before the major part of program benefits begin to be realized. The program is designed to be continued into an equilibrium control stage which is not reached during the initial five years. Thus we have conjectured a probable flow of costs and benefits over a ten year period. The path of costs reflects the fact that cost can be expected to be reduced gradually from a peak in the fifth through the seventh years to a control-maintenance level of approximately fifty percent of peak expenditures in the tenth year.

The second change is to introduce an efficiency factor. The previous analyses have assumed that program efficiency, i.e. the quality of spraying, administration and distribution, is 100%. In the final analysis we have assumed that program efficiency[1] is considerably less than perfect in the initial two years and increases to a peak level of 85% in the final years.

[1]The values for the efficiency rates were chosen in consultation with a team member having considerable experience in the administration of malaria control projects.

Under these assumptions (See Table 1) the benefit/cost ratio is 1.07 and the IRR is 17%. This result, which we feel most clearly reflects the actual operating conditions, demonstrates the sensitivity of the economic viability of the program to the efficiency of program operations. This underscores the importance of program administration and the feasibility of the targeted coverage. There is clearly no margin in these results for a failure to meet the schedule of targeted coverage.

D. Two Significant Omitted Economic Benefits

The results of the above cost benefit analysis, which shows that the proposed program is only marginally economically viable, should be tempered by a consideration of two additional classes of benefits which it has not been feasible to include in the time given for this study and which would in any case prove difficult to incorporate. The first omitted benefit is that the program can be viewed as one component of the necessary infrastructure for planned transmigration to the Outer Islands. To the extent that the program proceeds on target and effectively reduces the level of malaria to .02 in the Outer Islands it will encourage transmigration and the settlement of new areas and a part of the economic benefits from this economic expansion would be attributable to the malaria control program. The second omitted class of benefits is derived from the reduced rate of reinfestation on Java-Bali-Madura accompanying inter island population movement. A reduced incidence of malaria on the Outer Islands would therefore, potentially reduce the cost of control on Java-Bali-Madura. The importance of these omitted benefits is judgemental but they are potentially sizable enough to offset the high cost of the program and provide a highly favorable benefit/cost ratio and IRR.

III. Employment and Income Distributional Effects of the Program

The program provides for the training and employment of approximately [illegible] workers involved in spraying, transport, microscopy and administration. There will also be additional gains in employment through the multiple effects of the domestic part of program expenditures and through the encouragement of transmigration. The substantial employment effects will be dispersed regionally.

Because the incidence of malaria is higher in agricultural families the benefits will favor rural areas. From the point of view of distribution among income groups the program is favorable since incomes in rural areas tend to be low.

Table 1

Cost-Benefit Analysis with Best Estimate of Program Efficiency (Quality of Coverage), Program Extended into Maintenance Phase (Assuming Eight III Days per Year per Case)

(Rp. x 10^6)

Year	Program Costs[1] (Planned Five Year Expenditures)	Possible Program Costs in Additional Five Years[2]	Assumed Program Efficiency[2]	Program Benefits[3]
1979	4170		.6	1472
1980	4198		.6	2038
1981	5601		.7	4725
1982	6828		.8	7151
1983	7865		.85	9962
1984		7500	.85	10000
1985		7500	.85	10000
1986		6500	.85	10000
1987		5000	.85	10000
1988		4100	.85	10000
Present value at 15% discount rate		20430		31030

Benefit/cost ratio at 15% discount rate = 1.07
Net present value at 15% discount rate = 2600 ($9.3 million)
Internal rate of return = 17%

[1] See Table 4 in the appendix.

[2] See the discussion in the text.

[3] The benefits are derived by multiplying program efficiency times the total estimated benefits in Table 5, Part A. It is assumed that the level of protection in the fifth year is continued into the maintenance phase.

PART III

E. Environmental Analysis for Outer Island Malaria Control

An environment assessment for the malaria control project will be begun when all relevant reports and EA's have been assembled. Points of similarity between this project and previous EA's, both of DDT use and of other malaria control programs, will obviate the need for duplication of other analysis. Therefore, the Indonesia EA will concentrate on features unique to the proposed program, such as relationship to transmigration and the opening of new lands. As soon as all information is assembled, a plan of work will be established, and an estimated completion date will be cabled to Washington.

PART IV - IMPLEMENTATION PLANNING

A. Administrative Arrangements

I. Government Administrative Arrangements

The Government with the technical advice and assistance of WHO and USAID will assume administrative, technical and operational responsibility for the malaria program. Within the Government the implementing agency is the Ministry of Health and within the Ministry the Sub-directorate of Malaria will be responsible for the execution of the Plan of Operation. It is extremely critical to the success of the malaria program that close coordination and cooperation exist between the Sub-directorate of Malaria and other elements of the Ministry.

The leadership of the Central Government, including the Ministry of Health, supports the malaria control program as a national priority.

a. The Malaria Control Program (MCP)

The Director of the malaria Sub-directorate reports to the Director of Vector-Borne Diseases. The Sub-directorate of Malaria has the technical responsibility for planning, budget and finance, direction, training, operations and evaluating of the national malaria effort. The Provinces carry out the operational field work through their provincial and regency staffs. From Jakarta, technical direction (including training) is sent through the CDC Directorate in each Province to the Regency CDC, to the sub-district (usually a health center). The line of control of operations (in contrast to technical direction) is done by the Ministry of Health through his provincial representative (Ka.Kan.Wil.). The political levels of government, provincial governors and regency heads exercise considerable authority and are ultimately responsible for the malaria control program.

In the provinces outside Java-Bali, a variety of organizational patterns are present to carry out the malaria control program. The Regency often sets different priorities for malaria activities and in some regencies the staff may spend as low as 30% of the CDC effort and resources in malaria (source: 1977 Management Analysis Report). This low time percent for malaria control leads to lack of supervision in field operations and evaluation activities which is not conducive to an effective operation. On the other hand, the transmigration areas receive priority attention.

The expansion of the malaria activities into the Outer Islands will require a more direct line of authority by the malaria program. In December 1977, at the National Health Workshop held in Jakarta, the National and Provincial Health authorities agreed to a line of

authority which directly controls CDC staff including malaria down to the Regency level. The acceptance of this administrative change and the creation of more national direct control of field staff as well as agreement to establish required positions for the malaria program is to be a Condition Precedent in the Loan. The present malaria control programs cannot be effectively operated and evaluated unless this major administrative change is made. It is understood that the change must be accepted by the Indonesia Cabinet.

The MCP employs 13,682 full-time and 87 part-time employees (1977). This staffing does not include temporary (spraymen) employees which number in the hundreds or additional employees hired by the Regency. As approximately 89% of the total employees are employed on Java-Bali the program plans a major increase of its staff in Outer Island areas of approximately 1,500 people.

Organizational charts for the Ministry of Health and the Directorate of Vector-borne Diseases are attached in Annex 5.

b. The General Health Services - Government Medical Institutions

The government medical institutions will play an increasingly important role in the malaria program. There are 4,251 Government Hospitals and Health Centers in Indonesia. These institutions have the responsibility to detect and treat malaria cases. In the Outer Islands the medical institutions do provide limited information and data on focal areas of malaria. In the latter stages of the program these institutions will be responsible for maintaining the malaria gains. From the beginning of the program these institutions are to be included in the planning and execution of the program.

c. Other Government Departments

It is recognized that malaria affects many segments of development activities and coordination and cooperation with other GOI and private agencies is necessary. Special emphasis is given to coordinating with the Departments of Public Works, Transmigration, Education, Agriculture, Interior, Finance, and National Economic Planning Board (BAPPENAS). The support of malaria control in Irian Jaya is funded by the Ministry of Interior.

There is a national working committee on transmigration headed by the Minister of Transmigration to work out problems in health and malaria in and around transmigration projects. The Directorate General of CDC participates as a member of this intersectoral committee.

II. AID Project Administration

AID's primary means of insuring progress and compliance with the

Plan of Operations will be through the daily contact of the direct-hire/ PASA and contract U.S. technical assistance staff. The major program reviews scheduled for the second, third and fourth years of the project are to insure compliance to the conditions precedents of the Loan. The annual plans of action will also provide important benchmarks in the project implementation.

a. Project Technical Assistance

The provision of direct AID technical assistance to the project is considered essential. It is planned that from the first year of the project two direct-hire/PASA malaria specialists will be assigned to this effort with the majority of their effort being devoted exclusively to the Outer Island work. The two direct-hire or PASA personnel will be (1) Senior Malaria Advisor (Team Leader and Project Manager); (2) a publich health management officer (adm., supplies, logistics). These two personnel will be posted in Jakarta. In the third year of the project, an additional five U.S. malaria specialists (operations) will be assigned to the project in field areas outside of Java-Bali. The five U.S. technicians for the Outer Islands will be obtained by Contract or PASA with the USPHS, EPA or similar organization. It is expected that these five men will require up to three months of intensive training in malaria control work and language prior to assignment. A possible source for contract personnel might be through the American Mosquito Control Association or American Public Health Association. Perdiem and travel costs of the AID project personnel will be paid by AID using grant funds. The malaria control project manager will be responsible to the USAID Chief of Health/Nutrition. The GOI will assign one working vehicle procured under the AID loan funds for each field operation specialist and the senior malaria advisor for official duty responsibilities.

The functions of this project group are:

1. Maintain liaison with MOH, sub-directorate of malaria and other government offices, WHO and other foreign donors, as appropriate, and advise on AID regulations, policies and procedures;

2. Prepare required documentation for AID project financing;

3. Assist and/or locate specialized expertise or training for the malaria program when requested;

4. Review material submitted in fulfillment of the Loan CP's and advise the Government and AID if these materials fulfill conditions;

5. Review project reports, make periodic field visits to keep informed of program progress (including safety procedures);

6. Participate in annual reviews and evaluations of the program;

7. Provision of technical advice to the program on the organization, operation evaluation of the program including training and research;

8. The operations specialists assigned to the Outer Islands will provide operational advice to their provincial counterparts, the Director of Vector-Borne Diseases, and report to the USAID team leader on the field programs, i.e., epidemiology, spraying, surveillance, operational field trials and training. These specialists will also be responsible for monitoring AID-source supply and transport supplies and equipment in the field.

9. The management specialist will insure that procurement documents are in order, commodity specifications are being met, logistics are functioning and that end-use audits are done. The GOI Malaria Control Program will provide a counterpart to each U.S. Malaria Specialist.

b. Evaluation

The major elements of evaluation that will be addressed in the project are:

1. Progress towards selected program and plan of action targets;

2. Physical operational problems and solutions recommended to solve these problems;

3. Management problems such as communications, procurement and distribution, program staffing and personnel problems, reporting, funds availability and utilization;

4. Adequacy of epidemiological activity;

5. Progress on research, surveillance and health education objectives;

6. Training progress towards meeting manpower requirements;

7. Cultural problems relating to program acceptance;

8. Environmental health problems associated with the use of insecticides.

Results of the evaluation and actions taken to correct program shortcomings will be taken into account by AID in making a decision for release of funds.

The MCP will be required to submit a quarterly report on activity, accomplishment and short falls to the USAID Project Manager.

AID project manager or his representative will be included in Inter- and Intra-governmental discussions, where appropriate, on malaria control on the same basis as WHO.

U. S. FISCAL YEARS (1 OCTOBER - 30 SEPTEMBER)

ACTIONS	1978	1979	1980	1981	1982	1983
Loan Processing	a) Agreement signed (Aug) b) Grant Approved c) Loan signed, Auth. (Sept) (5.0 mil.)	Loan signed, Auth. (5.0 mil.)	Agreement signed Loan Auth. (25.0 mil.)			
Evaluation		1st years CP's met (Dec.)	2nd years a) CP's met b) Situation Analysis	3rd years a) CP's met b) In-depth Review	4th years a) CP's met b) Situation Analysis	5th years a) CP's met
Program Operations	Continued operation on Java-Bali	Java-Bali Operational Research Outer Islands Baseline Training	Java-Bali Operational Research Outer Islands Baseline Training	Java-Bali Operational Research Outer Islands 1st spraying Operation Training	Outer Islands Spraying Oper. Training, Evaluation	Outer Islands Spraying Oper Training Evaluation
Procurement	a) Completion of AID 1st Malaria Loan b) No new Loan	Dec-tender Feb-delivery Jun-1st yrs order	tender award delivery	tender award delivery	tender award delivery	tender award delivery
Loan Disbursement	a) Disbursement of previous malaria loan b) New loan funds auth. ($5.0 mil.)	letter of commitment & letter of credit opened (Dec) ($5.0 mil.)	Letters of commitment & credit opened ($25.0 mil.)			

2. Insecticide Procedures

The proper management of insecticides used in the Malaria Control Program (MCP) is of major concern to the GOI and to the other agencies involved. Special stress will be given during the project period in the safe application of all insecticides used at the village level to insure field personnel and villagers are not subjected to any health hazard in the application or storage process.

It has been determined through field visits to the program that the handling of DDT is monitored and safety instruction is given to spraymen on its proper use. There has never been a reported problem regarding human intoxication in the malaria program since its establishment in connection with the use of DDT. The Outer Islands program will use only DDT in its proposed operational activity over the project period.

In 1971 the report of the Director General of the World Health Organization emphasized the continued importance of DDT in operations against malaria. Excerpts from this report (which appeared in the WHO Chronicle of May 1971) are quoted below:

"The safety record of DDT for man is remarkable. At the height of its production over 400,000 tons per year were used for agriculture, forestry, public health and other purposes." "Yet, in spite of the prolonged exposure of the populations of the World and the heavy occupational exposure of a substantial number of people, the only confirmed injurious effects have been from massive accidental or suicidal ingestion."

On Java-Bali, there will be limited use of insecticides other than DDT in the operational trials in the DDT-resistance An. aconitus areas. The insecticide being considered for these trials is Fenitrothion, 40% wdp. This product has already been used in limited scale village trials near Semarang without adverse effects.

3. Health Safeguards Concerning Pesticides

Instruction in safety precautions, necessary supervision and protective equipment will be provided to spray personnel concerned with handling or applying insecticides. The Malaria Program plans to carry out the following specific measures during the operational trials.

a. Training will be carried out for all spray personnel on proper insecticide handling.

b. Blood samples for cholinesterase will be taken for all malaria personnel involved in operational trials using O.P. compounds prior to the institution of spraying and at monthly intervals to note if any changes have occurred in cholinesterase levels.

c. The MCP will issue protective clothing, gloves, face masks to

all spray personnel engaged in house spraying of O.P. compounds. Compliance is to be monitored by Provincial and National Headquarters staff. (O.P.-organophosphorus i.e. malathion, Fenitrothion)

d. Personnel in the program will be briefed on the signs and symptoms of O.P intoxication, and upon display of any questionable symptoms, supervisors are instructed to transport the spray personnel immediately to the nearest hospital. Supervisors will have atropine available to them and will be trained to administer it.

e. All spray teams will be accompanied by a supervisor who has had training in proper handling and application of insecticides.

f. Proper and approved AID and/or WHO specifications will be used in the procurement of insecticides including strict testing criteria.

It is AID's conclusion that the Government will continue its successful endeavors to insure all aspects of proper insecticide procedures and that the past excellent safety record will be maintained. In addition as a Condition Precedent AID is requiring a detailed plan for insuring the safe use of insecticides in the program and a covenant requiring the implementation of the plan. The AID project technical assistance personnel will be responsible to see that proper insecticide procedures are followed in the field.

4. Transportation and Storage

Transportation and storage of insecticides does not appear to present a problem for program operations in Java-Bali. The MCP has made sufficient administrative progress in these areas over the years and AID assistance is not required.

However, in the Outer Islands the transportation and storage aspects are matters of concern and a great deal of planning and effort will be necessary if these important elements of the program are to work properly and in a timely manner.

The Study Group for the Outer Islands of March-May 1978 included these two important subjects in their data collection. The transport procurement to be supported by the AID Loan for the Outer Islands has been calculated on a Regency by Regency basis. Commercial transport is used where possible for water and land transport. All motor transport to be provided under the Loan will be 4-WD standard jeep-type vehicles and pick-ups. Approximately, 350 motorcycles (125 cc) will be provided to supervision staff. All vehicles and motorcycles will be U.S.-source items. Approximately 15% of the total cost of vehicles will be budgetted for spare parts.

Storage capacity at the major sea ports, the main railway terminals,

at primary distribution points and at end-use points is considered adequate in most areas. (Management Report-1977, Pg. 16 and findings of 1978 Data Collection Team). The addition of some warehouse facilities may be necessary in some more remote areas, but usually commercial or government warehouse facilities are available.

5. Procurement

Procurement of AID-source insecticides and other commodities for this loan will be carried out through the USAID/Indonesia procurement systems using the General Services Administration (GSA) where possible. Such procurement will follow standard AID regulations and will meet proper specifications as approved by AID. The provision of an independent contract on-board inspection service will be provided under loan funds to survey AID-source commodities arriving in Indonesia under this loan.

6. Disbursement Procedures

A standard Letter of Commitment/Letter of Credit procedure will be used for procurement of commodities under this loan.

AID-supported training will be handled through an AID disbursing authority with PIO/P's applied against grant funds scheduled for training. Limited research support will be funded by grant funding and will require Mission approval of the research proposal prior to its initiation in the field.

The loan disbursement period will be five years from the date of the first loan disbursement.

PART IV

C. Evaluation and Reporting Arrangements for the Project

1. General

Program evaluation will take two principal forms: (a) continuous feedback (reports with verification by the Malaria Control Program) from Provincial offices on program operations and effectiveness in accomplishing project purposes and outputs; and (b) formal Situation Analysis Reviews or In-Depth Reviews.

The Malaria Control Program will provide detailed Quarterly Progress Reports to AID on the technical, operational and administrative facets of the program including training and operational field trials. Reports will provide details on performance as compared to targets. If the program is not meeting targets, the reports will explain reasons and corrective action being taken. If WHO Quarterly Reports are complete enough, these reports may be used to meet all or part of this AID quarterly submission.

Evaluation meetings will be held periodically for top malaria program management, WHO and AID and other donors, if appropriate, to evaluate policy level program progress and to recommend changes where suitable.

The evaluation should also include a review of the role and relationship of the various other components of the general health services in assisting the Malaria Program to meet its objectives.

2. Purpose Achievement Indicators

There are two purposes to the proposed project:

a. To further strengthen and expand the protection of anti-malaria activities from the present priority areas to other malarious and priority areas of the Outer Islands.

b. Preserve gains, resolve problems and remove obstacles to effective malaria control on Java-Bali.

The End of Project Status for the first purpose will be (1) the reduction of the parasite rate to below 2.0% in the operational areas and (2) increase anti-malaria services from 2.5 million to 16 million or more by 1984.

The End of Project Status for the second purpose will be to (1) remove 90% the present caseload on Java-Bali which will be satisfied if the API is 1.7 case per 1,000 in high incidence areas and (2) to achieve a parasite rate of 0.1% is achieved in low incidence areas.

Other outputs from the project which will serve as purpose achievement indicators in the End-of-Progress Status include:

a) 7,300 malaria officials trained or re-trained.

b) 3 or more Regional Training Centers established.

c) Anti-larval work expanded from 5,000 hectares to 13,000 hectares or more.

3. Output Indicators

Output indicators are broken down into quantifiable project outputs over the five year project life. They represent planned performance targets in functional activities of the Malaria Control Program in the Outer Islands and Java-Bali.

a. Spraying indicator is divided into two components (1) houses/ structures sprayed in operational areas and (2) efficiency or household acceptance.

(1) Java-Bali

Year	1	2	3	4	5
Houses Sprayed*	1,200	1,200	1,200	1,200	1,200
Efficiency (coverage)	80%	80%	80%	80%	80%

* Houses covered by spraying in 1,000's.
House spraying is reduced as surveillance takes over in areas withdrawn from spraying.

(2) Outer-Islands

Year	1	2	3	4	5
Houses targeted (1,000)	3,697	5,305	9,110	11,984	15,321
Efficiency (coverage)	70%	75%	75%	75%	80%

b. Case Detection outputs are divided into the number of Passive Case (PCD) slides (in 1,000's) collected and the expected percent of PCD slides to total population under treatment for all causes in health institutions.

(1) Java-Bali

Year	1	2	3	4	6
PCD slides collected (1,000's)	580	590	600	610	620

Percent of PCD slides to total population (million) under treatment	6	6	7	7	8

(2) Outer Islands

PCD slides collected (000's)	240	250	300	350	350
Percent of PCD slides to total population under treatment (millions)	4	4	5	5	5

c. Anti-larval Operations can be measured by the number of hectares treated over the life of the project.

(1) Java-Bali

Year	1	2	3	4	5
Number of hectares	5,000	6,000	8,000	10,000	13,000 or more

d. Training is a major output indicator for the project. This output indicator is limited to the Outer Islands.

Year	1	2	3	4	5	Total
Prov. Chief	18			18		
Kep. Operations	117	6	124	-	10	257
Kep. Evaluation	122	6	124	-	10	232
Oper. Assist.	99	22	109	22	21	273
Eval. Assist.	99	26	109	26	21	277
Squad Chief	460	692	1158	1297	1632	5237
Spraymen	2254	2815	5483	6813	8323	22688
Microscopist (malaria & PH)	155	38	170	26	38	474
Assist. Entomologist	109	6	122	15	22	274
Assist. Malariologist	117	6	124	-	10	252
Entomologist	18	-	18	-	-	36
	3428	3617	7431	8217	10087	29994

The above table also includes retraining.

e. Other Output Indicators for Outer Islands

Year	1	2	3	4	5
Operating Vehicles	95%	90%	85%	85%	85%
Approved Plan/Action	1	1	1	1	1
No. of Trainers assigned and in place	8	12	12	12	12
No. of Regional Training Centers Operating	2	3	3	3	3

PART IV

D. Conditions Precedent to Disbursement

1. First Disbursement. Prior to the first disbursement under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Borrower will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) An opinion of the Minister of Justice of the Borrower that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Borrower, and that it constitutes a valid and legally binding obligation of the Borrower in accordance with all of its terms.

(b) A statement of the name of the person holding or acting in the office of the Borrower and of any additional representatives, together with a specimen signature of each person specified in such statement who are duly authorized to accept any instrument signed in implementation of this loan.

(c) A time phased implementation plan covering project activities for the period from 1979 through 1983.

(d) Written assurance that the estimated annual expenditures for each year during which the project is being implemented (other than U.S. dollar costs to be financed under the Loan) will be made available to permit the work of the Project to proceed on a timely basis.

(e) A schedule for the evaluation program referred under Special Covenants has been prepared.

2. Disbursement for Project Activities. Prior to disbursement under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for the purpose of financing project activities, the Borrower will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) Evidence that the World Health Organization (WHO) has agreed to provide four technical advisors for the life of the Project (1979-1983) including a malariologist, two entomologists, and an epidemiologist.

(b) Evidence that an adequate number of vehicles and boats are on hand for satisfactory implementation of the Project, and that a plan has been established which will assure adequate maintenance and timely replacement of such vehicles and boats.

(c) Evidence that a plan has been established for safe handling of insecticides used for the Project to assure a minimum health risk to applicators, handlers, and the populace in the target areas.

(d) Evidence that Borrower has executed a contract with a United States firm which will inspect all loan funded commodities for the Project, other than vehicles, to assure their conformance with United States standards.

(e) Evidence that inland transportation and storage facilities and other project related commodities from port of entry to point of end-use are adequate for timely implementation of the Project.

3. Notification. When A.I.D. has determined that the conditions precedent specified in Parts 1 and 2 have been met, it will promptly notify the Borrower.

4. Terminal Dates for Conditions Precedent. If all the conditions specified under Part D.1 have not been met within 90 days from the date of this Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate this Agreement by written notice to Borrower.

E. Special Covenants

1. Project Evaluation. The Parties agree to establish an evaluation program as part of the Project. Except as the Parties otherwise agree in writing, the Program will include, during the implementation of the Project and at one or more points thereafter: (a) evaluation of progress toward attainment of the objectives of the Project; (b) identification and evaluation of problem areas or constraints which may inhibit such attainment; (c) assessment of how such information may be used to help overcome such problems; and (d) evaluation, to the degree feasible, of the overall development impact of the Project.

2. Malaria Education Program. Borrower covenants that in each year during which the Project is being implemented, it will carry out a malaria education program within schools, villages, community organizations and other appropriate bodies to inform the general public of the national anti-malaria effort and to solicit their cooperation in pursuing project activities.

3. Maintenance Plan. Borrower covenants that the maintenance and replacement plan referred to in Part IV.D.2. will remain in effect and operative throughout the life of the Project.

4. Safety Plan. Borrower covenants that a plan for safe handling of insecticides used for the Project will remain in effect and operative throughout the life of the Project.

5. Plan of Operations. A five year Plan of Operation for the period 1979-1983 approved by the Borrower and WHO and which has received favorable A.I.D. approval is in effect.

6. Borrower Covenants that all insecticides and other commodties and related services utilized in implementation of the Project will be provided to the target population without charge of any kind by any person, governmental body or other entity.

A N N E X E S

ANNEX 1

IN-DEPTH EVALUATION OF THE

MALARIA CONTROL PROGRAM - INDONESIA*

August 1 - 31, 1977

Copies Available:

1. USAID/I - Health and Nutrition
2. Regional Malaria Office/Colombo, Sri Lanka
3. ASIA/TR/HN, AID/W
4. ASIA/PD - Indonesia, AID/W
5. DSB/Health, AID/W
6. Indonesia Desk, AID/W

* Due to bulk of this Report it was not possible to include this Annex as an Attachment to all Project Papers.

ANNEX 2-a

C.I.M. PLANNING - TRAINING

Province: Outer Island Program
Kabupaten: _____

Prepared by: _____
Assisted by: _____
Date: _____

CATEGORY	Trained	Personnel To Be Trained Plan B Years 79/80	80/81	81/82	82/83	83/84	Total	Plan B Years 79/80	80/81	81/82	82/83	83/84	Total Days	COST
Chief Malariologist		18	-	-	18	-	36							
Malariologist		117	6	124	-	10	257							
Kep. Oper.		117	6	124	-	10	257							
Kep. Eval.		122	6	124	-	10	262							
Oper. Asst.		99	22	109	22	21	273							
Eval. Asst.		99	26	109	26	21	281							
Squad Chief		460	692	1158	1297	1632	5237							
Sprayman		2254	2815	5483	6813	8323	25688							
Microscopists		155	35	170	26	38	424							
Assist. Entomologist		109	6	122	15	22	274							
Voluntary Collaborators		-	-	-	-	-	-							
M.D & Para-Med. Health Ctr		-	-	-	-	-	-							
Insect Collectors (2)		-	-	-	-	-	-							
Spec. Lab Technician		18	4	4	18	4	48							
Entomologist		18	-	18	-	-	36							
Totals		3586	3618	7545	8235	10,091	33,075							

ANNEX 2-b

C.I.I. PLANNING - COMMODITIES

Province: ~~Outer~~ Islands Program
Kabupaten: _____

Prepared by _____
Assisted by: _____
Date: _____

COMMODITY	UNIT	Plan A B Years						Additional Years						Plan B	COST
		79/80	80/81	81/82	82/83	83/84	Total	79/80	80/81	81/82	82/83	83/84	Total		
Pick Up 4 WD		61	23	10	-	-	94								
Carry All		6	-	-	-	2	8								
Jeep 4 WD		68	16	21	-	-	105								
Jeep 2 WD		-	-	-	-	-	-								
Motorcycles		90	71	29	4	6	200								
Duplicators		18	-	-	-	-	18								
Boats Inboard		15	-	-	-	-	15								
Boats Outboard		15	-	-	-	-	15								
Spray Cans		2,900	1,600	4,000	1,400	12,00	11,100								
~~Xxxxxxxxx~~ Miscroscopes		155	38	21	26	-	240								
Typewriters		140	-	-	-	-	140								
DDT 75% (Metric Tons)		1,150	1,750	2,950	4,200	5,250	15,300								
Calculators		140	-	-	-	-	140								
Weighing Scales		280	-	140	-	-	520								
Chloroquine (1000)		10,750	15000	32500	44250	61250	163750								
G.G. SLT		280	-	140	-	-	420								
[illegible]		140	-	-	-	-	140								
~~Xxxx~~ Stereo Miscroscopes		18	-	-	-	-	18								

ANNEX 2-c

Insecticides (DDT) in Metric Tons

Province	Plan A						Additional						Plan B
	79/80	80/81	81/82	82/83	83/84	TOTAL	79/80	80/81	81/82	82/83	83/84	TOTAL	
Kalimantan Barat	36	36	36.2	37.2	37.6	182.5	-	21.92	52.3	67.7	116.1	279.72	465.22
Sumatera Barat	54.28	72.81	73.01	73.1	73.96	355.2	7	91.26	407.61	412.46	416.86	1348.29	1703.5
Sumatera Utara	83.37	85.67	88.51	91.25	94.2	442.99	53.02	116.05	344.53	696.88	956.12	2188.12	2607.31
Lampung	57.25	59.22	59.93	61.26	63.73	300.99	-	56.7	153.58	286.8	355.42	857.5	1158.49
Jambi	41.12	42.08	42.88	43.69	44.49	214.26	18.24	57.28	105.28	139.96	158.2	476.76	690.42
Riau	13.9	14.3	14.7	15.1	15.3	73.5	27.2	62	109.6	129.9	142.6	443.5	517
Sumatera Selatan	58.8	59.6	60.9	62.5	63.4	305.1	6.3	28.9	78	119.3	170.6	403.1	708.2
D. I Aceh	43.14	44.13	45.13	45.15	47.23	225.83	12.69	24.46	104.13	117.	234.1	552.1	778.9
Nusa Tenggara Barat	43.10	44.06	45.12	46.14	47.20	225.62	34.63	69.22	157.76	214.05	270.40	746.06	971.68
Beng Kulu	31.68	32.51	33.34	34.21	35.1	166.84	15.2	34	53.4	115.71	153.96	373.23	540.1
Sulawesi Tengal	36.2	37.2	37.2	39	40.2	190.5	28.8	47.2	69	93.2	120.4	358.5	549
Kalimantan Timur	27.7	24.7	25.2	26.2	26.9	126.7	18.8	29.4	42.5	60.2	77.3	228.3	355
Kalimantan Tengah	21.2	21.8	22.1	22.7	23.7	111.5	31.5	36.6	42.1	50.9	61.3	222.4	333.9
Kalimantan Selatan	47.7	49.1	50.1	51.3	52.3	250.5	14.6	26.4	61	106.1	163.7	371.8	622
Sulawesi Utara	25.86	26.56	27.26	28	28.8	136.1	17.8	35.62	84.39	115.23	192.8	410.21	546.31
Maluku	20.	20.35	20.8	21.18	21.6	103.6	17.5	35.02	59.9	81.99	110.4	304.81	408.41
Sulawesi Tenggara	39.81	41	41.2	42	42.3	209.3	22.97	45.85	123	239.1	285.2	716.12	925.42
Sulawesi Selatan	141.1	143.9	146.8	149.7	152.7	734.2	31.76	50	76.7	364.2	551.6	1,074.26	1,808.46
TOTALS	822	850	886.44	817.6	910.7	4,355.23	358	868	2,124.8	3,009	4,537.1	11,703.2	15,289
To Be Purchased							1,150	1,750	2,950	4,200	5,250	15,300	

Outer Islands Program — Coverage Totals — Plan B

S & T - Spray Treatment — T- Treatment Only

PROVINCE	79/80 S & T	79/80 T	80/81 S & T	80/81 T	81/82 S & T	81/82 T	82/83 S&T	82/83 T	83/84 S & T	83/84 T	1,000 TOTAL Pop.
Kalimantan Barat	101.1	33.4	165.7	101.1	200.1	144.9	360.2	103	439.1	111.9	2,062
Lampung	162.6	-	104.6	-	738.8	171	999.9	342.1	1251.8	512.9	4,100.8
Sumatera Barat	293.9	-	497.7	-	1,518.1	-	1545.8	-	1560.4	-	4,100.8
Sumatera Utara	397.42	-	582.7	-	1,315.45	567.4	2173.1	1135.6	2743.	1532	9,028
Jambi	185.3	254.3	301	315	462.4	379.4	538	437	635	515	1,487
Riau	120	256.3	233	483	380	726.4	444	906.3	495	989	2,196
Sumatera Selatan	186	51	243	123	368	301	526	438	662	622	4,580
D. T. Aceh	175	-	210	-	460	182	687	364	920	545	2,738
N.T.B	243	-	354	-	635	199	815	398	995	598	2,984
Bengkulu	148	-	210	-	275	48	470	97	591	145	1,075
Maluku	118	-	174	-	253	105	333	215	415	323	1,375
Sulawesi Utara	137	-	195	-	350	166	448	332	547	488	2,210
Sulawesi Selatan	536	-	607	-	708	441	1294	881	1892	1322	6,294
Sulawesi Tenggara	197	-	272	-	360	59	376	117	393	179	979
Sulawesi Tengah	201	-	261	-	331	109	411	217	498	326	1,585
Kalimantan Timur	155.3	-	198	-	248	102	315	203	377	303	1,389
Kalimantan Tengah	192	-	210	-	230	82	259	162	283	240	1,135
Kalimantan Selatan	147	-	185	-	295	119	456	244	620	357	1,799
*TOTAL	3,697	595	5,305	1022.1	9,110	3,904	11984	6,592	15321	8806	52,533

*Does not reflect population under coverage in Nusa Tenggara Timur and Irian Jaya.

Total expected 16,000,000 covered.

COMMODITY	Unit Price 79/80	80/81	81/82	82/83	83/84	Cost Plan B (In $1,000) 79/80	80/81	81/82	82/83	83/84	Total
DDT 75% WDP	1,778.7	1,868	1,961	2,056	2,162	2,056	3,222	5,079	8,635	11,167	30,159
Fenithrothion 40%	5,000	5,000	5,000	-	-	750	1,000	1,000	-	-	2,750
Fenithrothion 50%	5,000	5,000	5,000	-	-	250	250	250	-	-	750
Pick Up Truck J-20 Mod.	10,147	10,655	11,187	11,747	12,334	619	245	112	-	-	976
Carry All	10,000	10,500	11,000	12,000	-	60	-	-	24	-	84
125 CC Motorcyle	974	1,023	1,074	1,128	1,184	88	73	31	4.5	7	203.5
Jeep CJ -6 HWD Mod 84	6,615	6,946	7,293	7,656	8,040	450	111	153	-	-	714
25 Renault Diesel Eng.	6,641	6,974	7,322	7,688	8,073	100	-	-	-	-	100
40 Johnson Outboard	1,022	1,074	1,128	1,184	1,243	15.3	-	-	-	-	15.3
Chloroquine(1000)	16.70	17.53	18.49	19.33	20.30	180	263	601	848	1,244	3,136
Primaquine (1,000)	15	16	16.80	17.65	18.50	16	24	55	86	124	305
Spray Cans	50	52.50	55.13	57.88	60.78	145	84	221	81	73	604
Binocular Microscope	763	801.56	841	883	928	13.7	-	-	-	-	13.7
Monocular Microscope	465	487	512	537	564	71	18.5	11	14	-	116
Typewriter (18"Manual)	179	187	196	206	216	25.1	-	-	-	-	25.1
Filing Cabinet(5Drawer	149	156	164	173	181	21	-	-	-	-	21
Calculator(SharpCS1165)	170	179	188	197	207	24	-	-	-	-	24
Stencil Duplicators	300	-	-	-	-	5.4	-	-	-	-	5.4
5%/Yr Inflation Factor + 5% Contingency						4,889.5	5,290.5	7,513.0	9,692.0	12,615	40,000

Project Title & Number:
OUTER ISLAND MALARIA PROGRAM (OIM)

INPUTS: (in $1 million) Year	1	2	3	4	5
GOI					
Commo.	7.9	8.0	8.1	8.2	8.2
Oper.	14.0	11.5	12.4	12.4	13.0
AID (Loan)					
Comm.	4.9	5.3	7.5	9.6	12.6
AID (Grant)					
TA	.2	.2	.7	.7	.7
Training	.07	.07	.16	.16	.16
OP Funds	.1	.1	.1	.09	.09
OTHER	.07	.1	.1	.1	.1

Implementation Target (type & quan.)

See project paper for details

See loan and C.P.'s refer especially to provision of adequate staff for training and carrying out program.

GOI Records
WHO Reports
Periodic Reviews of Program
End-use Audits - AID, GAO
Field trip reports of AID/WHO technicians

Assumptions for providing inputs:

1. Availability of USAID malaria advisor and other T/A personnel.
2. Availability of adequate quality insecticides.
3. Availability adequate USAID operting funds.
4. Adequate timely planning coordination and cooperation between USAID and MOH for agreement and approval on terms of PP
5. MOH given authority funds to organize, recruit personnel needed and carry out program as planned.

INDONESIA

PROPOSED OPERATIONAL FIELD TRIALS

MALARIA CONTROL PROGRAM

1. Study of the impact of properly-timed and carefully-supervised intradomiciliary application of DDT in areas with refractory and susceptible populations of An. aconitus:
   - in areas where case incidence has increased.
   - in areas where case incidence had decreased.
2. Investigations of the bionomics of An. aconitus and An. sundaicus in different epidemiological zones.
3. Delineation of areas of chloroquine resistant P. falciparum infections in East Kalimantan and West Irian Jaya.
4. Continuing the monitoring of susceptibility status of falciparum malaria to chloroquine.
5. Investigation of the pattern of development of insecticide resistance under selective spraying.
6. Survey of An. sundaicus breeding sites to determine efficient and economic methods of control.
7. Study of the role of secondary vectors in malaria transmission in Java and Bali.
8. Identification of primary and secondary malaria vectors in the priority operational areas of the outer islands.
9. Epidemiological investigations relating to malaria transmission in the outer islands.

10. Study of the impact of the wide use of various pesticides in agricultural practices on the transmission of malaria.

11. Resting height study of An. aconitus populations refractory/susceptible to DDT.

12. Host preference study of An. aconitus population refractory to to DDT in sprayed and unsprayed areas.

13. Continuing the trials on the use of alternative insecticides against An. aconitus populations refractory to DDT.

14. Study of the effect of extremes of wet and dry season meteorological phenomena on malaria transmission.

15. Drug regimen trials for treating chloroquine resistance falciparum malaria.

16. Continuing the investigations of biological control of An. aconitus using larvavivarous fish.

17. Continuing the investigations of intermittent irrigation for control of the breeding of An. aconitus.

18. Investigations of the impact of insect growth regulators on An. sundaicus.

AID 1020-28 (1-73)

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

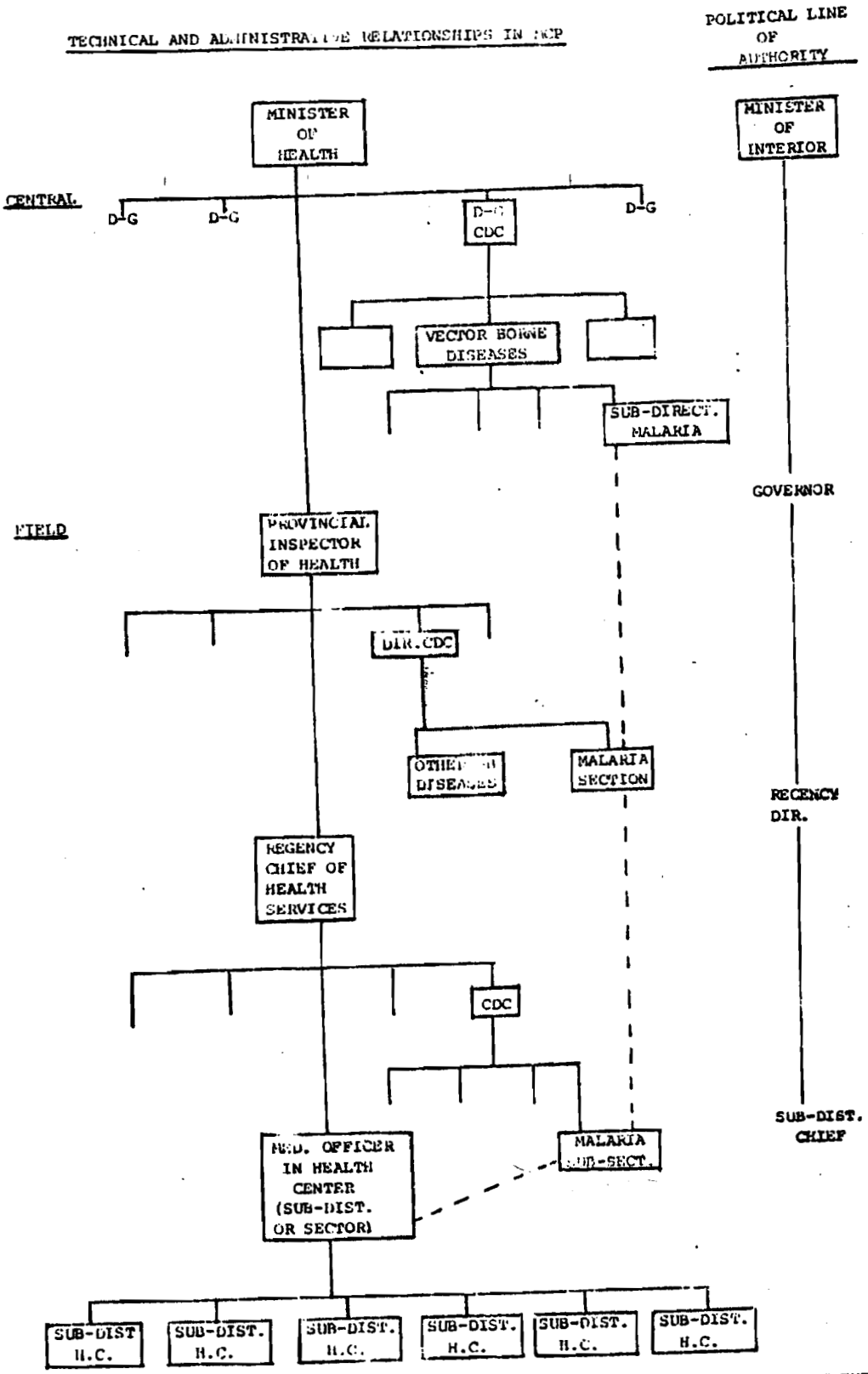
ANNEX 4

Project Title & Number:
OUTER ISLAND MALARIA PROGRAM (OIM)

Life of Project:
From FY 79 To FY 83
Total US Funding: (loan) $40.mil.
(grant) $4.0 mil.
Date Prepared: 4/25/78

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATOR	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Improve the health of rural poor people	Measures of Goal Achievement: 1. Measurable significant reductions in malaria morbidity and mortality directly attributable to interventions of the health services.	MOH records Reports from WHO	Assumptions for achieving goal targets: 1. GOI will continue to cooperate and support project; expansion of protection will lower malaria incidence. 2. Sustained economic growth to support national health development ant stress.
Project Purpose: 1. Further strengthen & expand the protection of anti-malaria activities from present priority areas (transmigration, high incidence & important economic areas) to other malarious and priority areas of the Outer Islands. 2. Preserve gains, resolve problems and remove obstacles to effective Malaria Control on Java & Bali	Conditions that will indicate purpose has been achieved: End of project status. 1. Population protected in O.I. increased from 2.5 mil to 16 mil 2. Malaria incidence in high incidence areas of Java & Bali reduced to API of 1.7. 3.Malaria cases on Java & Bali in low inci. areas reduced to 0.1 para. rate 4. Ongoing program in expanded area fully staffed out & equipped 5. Para.rate in oper. areas of O.I. reduced to 2.0% 6.Increase anti-larval activities from 5,000 hectares to 13,000 hec.	1. MOH records 2. Monthly joint GOI/WHO/AID reviews. 3. Quarterly reports from Malaria Control Program. 4. AID/WHO project monitoring	Assumptions for achieving purpose: 1. Rural areas of R.I. targetted for coverage will remain accessible. 2. Cooperation of Government Agencies with Malaria Program. 3. Adequate manpower can be recruited trained & appointed. 4. On-going research within Indonesia & world-wide will provide viable methods for control of malaria & solutions to technical problems. 5. Malaria control operations are acceptable to local people
Outputs: 1. New malaria personnel recruited and trained. 2. Current malaria personnel retrained. 3. Increase use of anti-larval methodology. 4. DDT & other materials in place in O.I. 5. Houses sprayed 6. Population provided malaria treatment with drugs 7. Plan of Operations 8. Annual Plan of Action	Magnitude of Outputs: 1. 7300 Malaria personnel recruited trained & assigned. 2. 200 existing personnel retrained 3. 800 MOH personnel trained in MCP 4. Increase anti-larval activities from 5,000 hectares to 13,000 hectares 5. 4 million houses sprayed once or twice by year V of project 6. 110 million will have access to anti-malaria drugs by year V.	1. Reports of U.S. T/A team. 2. Annual project evaluation data. 3. Provincial & MOH. records.	Assumptions for achieving outputs; 1. GOI willing and able to provide budget, positions, recruit, train and appoint expanded staff. GOI GOI has admin. control CDC activities in provinces. Malaria sub-direct. upgraded, staff can be expanded. 2. Current personnel can be motivated to accept retraining 3. MOH will budget labor for spraying and drug treatment.

TECHNICAL AND ADMINISTRATIVE RELATIONSHIPS IN MCP



EACH SUB-DISTRICT CARRIES OUT MALARIA OPERATIONS UNDER THE MEDICAL OFFICER OF THE HEALTH CENTER

10

ANNEX 6

INDONESIA - MALARIA CONTROL

CERTIFICATION PURSUANT TO SECTION 611 (e) OF

THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Thomas Niblock, principal officer of the Agency for International Development in Indonesia, having taken into account among other things the maintenance and utilization of projects in Indonesia previously financed or assisted by the U.S. and the commitment of the Government of Indonesia to carry out an effective malaria control program, do hereby certify that in my judgment Indonesia has the financial and human resources capability to implement, maintain and utilize effectively the subject capital assistance project for malaria control.

Thomas Niblock, AID MISSION DIRECTOR
Indonesia

Date

6C(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?	Yes. See Social Analysis Section in P.P.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?	No.
3. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?	Yes, the required determination has been made.
4. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?	We are not aware of any cases that make Indonesia ineligible under this section.
5. FAA Sec. 620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?	The majority of business and property owned by U.S. citizens which was nationalized during the Sukarno regime (principally in 1964 and early 1965) has been returned to U.S. owners or mutually acceptable settlement negotiated. A presidential Decree dated December 14, 1966 indicated its willin ness to return nationalized assets.
6. FAA Sec. 620(a), 620(f); App. Sec. 107, 114. Is recipient country a Communist country? Will assistance be provided to the Socialist Republic of Vietnam, Cambodia, Laos, Cuba, Uganda, Mozambique, or Angola?	No to both questions.

FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression?	No.
FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property?	No.
FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason?	Indonesia has initiated the investment guaranty program.
FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,	Indonesia has not seized any U.S. fishing vessels.
a. has any deduction required by Fishermen's Protective Act been made?	
b. has complete denial of assistance been considered by AID Administrator?	
FAA Sec. 620(q); App. Sec. 503. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default?	No to both questions.
FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)	15% of FY 77/78 budget was for defense. Imports of military equipment in FY 76/77 were .03% - 0.6% of total imports. GOI is not importing sophisticated weapons. (See JAKARTA 8629, 6/30/77)
FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?	No.

FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget?	Indonesia is not deliquent on UN obligation
FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism?	No.
FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA?	No.
17. FAA Sec. 669, 670. Has the country, after Aug. 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after Aug. 3, 1977 although not a "nuclear-weapon State" under the non-proliferation treaty?	No to both questions.
FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate?	No.

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria	Yes.
a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.	
b. FAA Sec. 104(d)(1). If appropriate, is this development (including Sahel) activity designed to build motivation for smaller families in programs such as education in and out of school, nutrition, disease control, maternal and child health services, agricultural production, rural development, and assistance to urban poor?	Yes.

61(cont'd)

c. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

GOI gives priority attention to increasing food production. 100-110 donor-supported projects assist food production, improved food storage, distribution and marketing.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

The GOI enacted a comprehensive law with built-in incentives for encouraging foreign capital investment.

GOI actively encourages private domestic investment. National elections were held in 1977. Parliament has a part in the budgetary process as it authorized the annual budget.

(3) Increasing the public's role in the developmental process.

(4) (a) Allocating available budgetary resources to development.

(b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations.

(a) GOI concentrates its domestic resources and foreign aid receipts on achieving economic stability and pursuing ambitious development program.
(b) only 15% of 77/78 budget was for defense purposes.

(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.

Major economic reforms were instituted with IMF/IBRD aid including incentives to growth of individual initiative and private enterprise.

(6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

38% of development budget is devoted to social field. GOI encourages self-help projects such as Food for Work.

d. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made?

Yes.

e. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, has Congress specifically authorized such use of funds; or is assistance for population programs, humanitarian aid through international organizations, or regional programs?

No.

2. Security Supporting Assistance Country Criteria

a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section?	N/A
b. FAA Sec. 531. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance?	N/A
c. FAA Sec. 533(c)(2). Will assistance under the Southern African Special Requirements fund be provided to Mozambique, Angola, Tanzania, or Zambia? If so, has President determined (and reported to the Congress) that such assistance will further U.S. foreign policy interests?	N/A
d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	N/A
e. App. Sec. 113. Will security assistance be provided for the purpose of aiding directly the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?	N/A

6C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b)

   (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%)?

   The Congress was notified in the Annual Budget Submission for FY78. Funds are authorized within the OYB.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

   (a) No.
   (b) Yes. Estimates are firm.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

   Not required.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?

   Not applicable.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

   Not a capital assistance project.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?	No.
7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	N/A
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	Not applicable (NA)
9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.	Financial and in-kind contributions of both private and governmental organizations and institutions are an integral part of project budgeting.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?	No.
11. ISA 14. Are any FAA funds for FY 78 being used in this Project to construct, operate, maintain, or supply fuel for, any nuclear powerplant under an agreement for cooperation between the U.S. and any other country?	No.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

This project addresses all the issues, except (b), directly and adequately.

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

(1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;

(2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;

by extending voluntary collaboration network for PCD

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

B.1.b (cont'd)

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

(a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

(b) to help alleviate energy problem;

(c) research into, and evaluation of, economic development processes and techniques;

(d) reconstruction after natural or manmade disaster;

(e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

Yes. GOI is willing to contribute funds to project. The GOI will satisfy loan agreement CPI's with regard their contribution to the project.

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed?"

No.

B.1 (Cont'd)

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.	This project will a. Increase the agricultural labor force by lowering illness and death from malaria, b. train 1000 or more new and 30,000 official and volunteer health workers c. extend house spraying to over 16,000,000 rural Indonesians, d. establish 3 or more training centers, e. control malaria in all transmigration areas and other of the 79 designated growth areas outside Java and Bali.
f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.	The project answers a basic health need recognized by government and requested by the people. Some of the country's brightest technicians and professionals will be involved. Others will be trained in a vocation on receive advance training in a profession.
g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?	Yes.
h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.	Almost all imported commodities financed by the loan will be of U.S. Source, Area of Production in the U.S. is unknown.

B. (Cont'd)

2. Development Assistance Project Criteria (Loans only)	WHO and the Japanese Government are financing other elements of this project and the health sector.
a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.	
b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.	Good to Excellent.
c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds $100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?	Yes.
d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?	Yes.
e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?	None.
f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?	Not for productive enterprise.
3. Project Criteria Solely for Security Supporting Assistance	
a. FAA Sec. 531. How will this assistance support promote economic or political stability?	By reducing the level of sickness and death, economic developmen can take place that assist in the maintenance of a tranquil state.
b. FAA Sec. 531(e)(1). Will assistance under the Southern African Special Requirements Fund be used for military, guerrilla, or paramilitary activities?	N/A

B. (Cont'd)

4. Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.] N/A

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America? N/A

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities? N/A

6C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by exclusion (as where certain uses of funds are permitted, but other uses not).

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A Procurement

1.	FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?	Not applicable, as only locally procurable commodities are involved.
2.	FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him?	N/A (see above)
3.	FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?	N/A
4.	FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?	N/A
5.	FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?	N/A
6.	MMA Sec. 901(b). (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.	N/A
7.	FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized,	Yes.

A? (Cont'd)

are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	
8. International Air Transport. Fair Competitive Practices Act, 1974 If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?	Yes.
B. Construction	
1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?	N/A
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	N/A
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million?	N/A
C. Other Restrictions	
1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?	N/A
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?	N/A
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.?	N/A
4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?	N/A

B. (Cont'd)

5. Will arrangements preclude use of financing:	N/A
a. FAA Sec. 114. To pay for performance of abortions or to motivate or coerce persons to practice abortions, to pay for performance of involuntary sterilization, or to coerce or provide financial incentive to any person to practice sterilization?	
b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property?	N/A
c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?	N/A
d. FAA Sec. 662. for CIA activities?	N/A
e. App. Sec. 103. to pay pensions, etc., for military personnel?	N/A
f. App. Sec. ~~106~~ 105. to pay U.N. assessments?	
g. App. Sec. ~~507~~ 106. to carry out provisions of FAA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending).	N/A
h. App. Sec. 112. To finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields?	N/A
i. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress?	N/A

(End)
March, 78

Annex 8

Economic Analysis

Table 1

Number of Cases and Deaths Prevented
by the Proposed Malaria Program

Part I. Spraying

Year	Population[1] (000) (1)	Planned Program Coverage[2] (proportion) (2)	Population Affected by Program (000) (3)=(1) x (2)	Cases Prevented[3] (000) (4)= .08 x (3)	Mortality Avoided[4] (5)= .001 x (4)
1979	50167	.234	11739	939	939
1980	51155	.313	16012	1281	1281
1981	52163	.563	29368	2349	2349
1982	53191	.750	39893	3191	3191
1983	54235	1.000	54235	4339	4339

Part II. Treatment

Year	Planned Number of Presumptive Treatments (000) (6)	Assumed incidence of malaria in patients[5] treated (7)	Number of Cases Affected by treatment (000) (8)=(6)x(7)	Mortality Avoided[6] (9)= .0005 x (8)
1979	600	.30	180	90
1980	1000	.24	240	120
1981	4000	.18	720	360
1982	6000	.12	720	360
1983	9000	.06	540	270

[1] A population weighted index of the annual outer islands growth rate, based on 1961-1971 census data, is 1.97% for all of the Provinces in the Outer Islands. Source: Central Bureau of Statistics, Social Indicators - 1973/74.

[2] Based on the program plan from the Ministry of Health.

Table 1

[3] It is assumed the average incidence of malaria (proportion of population per year) is .1. The malaria control from the present program is targeted to reduce the incidence to .02 in the covered population. The target of the program is thus to prevent a total number of cases equal to 8% of the covered population.
It is important to recognize that the incidence rate is a very uncertain estimate. The rates in specific geographic areas will differ markedly. Rates reported from clinics are subject to wide margins of error. Moreover, malariometric surveys in the outer islands have not been systematic and in most island areas we simply do not know the rate of malaria.
The .1 rate was taken from: In-Depth Evaluation of the Malaria Control Programme - Indonesia, GOI/AID/WHO Joint Team, Jakarta, August 1-31, 1977, Economic Analyses, p. 98.

[4] The true case fatality rate is unknown. The rate can very greatly depending on conditions and the relative prevalence of different malaria strains. We have arbitrarily used a case fatality rate of .001 after consultation with other team members and Ministry of Health officials.

[5] There is almost no basis on which to estimate the proportion of treated patients who will actually have malaria. We have arbitrarily assumed that the incidence of malaria in patients treated will be three times the probable incidence rate in the population in each of the five program years. If the incidence is actually higher the benefits from treatment provided by the planned program will be underestimated.

[6] It is assumed that the case fatality rate will be reduced by one half by treatment.

Annex

Economic Analysis

Table 2

Number of Cases Prevented in the Labor Force

Year	Labor Force[1] (000) (1)	Labor Force Affected by Program[2] (000) (2)	Cases Prevented in Labor Force (000) (3)= .08 x (2)	Cases in Labor Force Affected by treatment[3] (000) (4)
1979	26298	6153	492	94
1980	26981	8445	676	127
1981	27683	15586	1247	382
1982	28403	21302	1704	384
1983	29141	29141	2331	290

[1]The projections are based on the assumption that the labor force will continue to grow at 2.6% per annum. Source: American Embassy Jakarta's Annual Labor Report, June 10, 1977, p.3 and GOI/AID/WHO, In Depth ...., Economic Analysis, p. 96.

[2]Col (2) (table 1) x Col (1) (table 2).

[3]Col (1) (table 2) % Col (1) (table 1) x Col (8) (table 1)

Annex

Economic Analysis

Table 3

Daily Real Wage Rates

(Rupiah/Day)

Year	Wage Rate for Employed[1]	Shadow Wage Rate for Underemployed[2]	Shadow Wage Rate for family care[3]
1979	447	224	140
1980	457	229	143
1981	466	233	146
1982	475	238	148
1983	485	243	152

[1]The wage projections are based on an extrapolation of the 1972 wage (baseline index = 390). It is assumed that the real wage increases by two percent per annum. The wage estimates are derived from an urban survey. Because wages tend to be higher in urban areas these figures provide an overestimate of the average national wage. Source: Annual Labor Report, American Embassy, Jakarta, June 1977, p. 18 and GOI/AID/WHO, In Depth ....., Economic Analysis, p. 97.

[2]The shadow wage rate for underemployed is assumed to be one half the real wage for the employed.

[3]The shadow wage for female labor time spent in family care of the ill is calculated as .3125 times the real wage. This factor includes a consideration of busy versus slack season labor participation rates for women.

Annex

Economic Analysis

Table 4

Costs by Year of Program[1]
(Rp. x 10^6)

Year	Category			Total
	Training	Depreciable Equipment	Wages and Supplies	
1979	567	725	2878	4170
1980	255	412	3531	4198
1981	327	404	4870	5601
1982	249	257	6322	6828
1983	208	257	7400	7865
Total	1606	2055	25001	28662
Value of Capital remaining at end of five years[2]	1129	846		1975
Total costs less value of capital at end of five years	477	1209		26687

[1] The 5% per annum inflation factor used in the financial section has been removed to obtain the costs in real terms presented in this table. These costs represent the planned program expenditures from all sources (GoI + AID + other sources).

[2] This is the depreciated value of training and equipment at the end of five years. An attrition rate of .10 is assumed for the value of training. Straight line depreciation, assuming a life of six years, was used for equipment.

Annex

Economic Analysis

Table 5

Benefits from the Planned Malaria Program

in Outer Islands

(Rp. x 10^6)

A. Assuming six days lost per year per case of untreated malaria

Year	Value of Avoided Income Loss[1]	Value of Avoided Calorie Loss[2]	Value of Avoided Treatment Costs[3]	Value of Lifetime Earnings from Prevented Mortality[4]	Value of Avoided time in family care[5]	Total Benefits
1979	1131	127	196	324	178	1956
1980	1581	173	267	432	247	2700
1981	3191	339	490	826	496	5342
1982	4245	441	662	1090	652	7090
1983	5583	564	906	1430	857	9340

B. Assuming eight days lost per year per case of untreated malaria

Year	Avoided Income Loss	Avoided Calorie Loss	Avoided Treatment Costs	Avoided Mortality	Avoided time in family care	Total Benefits
1979	1521	172	196	324	240	2453
1980	2127	234	267	432	334	3394
1981	4297	462	490	826	675	6750
1982	5702	597	666	1090	884	8939
1983	7472	759	906	1430	1153	11720

[1]The value of avoided income loss due to spraying is calculated by multiplying the number of cases of malaria avoided by the average number of sick days per year for untreated malaria times the average daily real wage rate. For the underemployed the same procedure is used except that we substitute the shadow wage for the wage rate. The value of avoided income loss due to program treatment is calculated similarly except that we multiply by the average number of sick days per year less two days under the assumption that there will be an average of two sick days per case receiving program treatment.

Table 5

[2]The value of avoided excess caloric intake attributable to spraying is the product of the number of cases of malaria avoided times the cost of excess rice per day of illness (Rp. 20/day) times the average number of sick days per year per case. The value of avoided excess caloric intake attributed to program treatment is obtained similarly except that the number of ill days prevented per case is two less than under spraying.

[3]The value of treatment costs is the sum of drug costs plus outpatient clinic cost plus hospitalization cost. Drug cost is obtained by multiplying the number of cases of malaria who will be self-treated (.67 of all malaria) by 125 Rp. (the current cost of chloroquine, 100 Rp., plus 25 Rp. as an estimated cost of extra Jamu (traditional medicine) taken. Clinic cost is the number of malaria cases that will be clinic treated (assumed to be .07) multiplied by the cost of one clinic visit (500 Rp.). Finally, a small fraction of the malaria cases will require hospitalization. We use an average daily hospital cost of 3,000 Rp. and an average of five days of hospitalization. The estimates of health service usage are subjective and acquired from consultation with Ministry of Health officials.

[4]The estimated discounted average value of lifetime earnings for the average death prevented is 314,000 Rp. This is derived as a weighted average of the value of lifetime earnings from the average prevented death in separate age groups. The weights are the proportion of total deaths in each age group and are derived with reference to a life table for Indonesia and under the assumption that the case fatality rate in the 0-10 year age group is approximately five times the rate in the over 10 age group. The value of lifetime earnings at any age is derived by discounting future earnings at a rate of 15%. The age earnings profile used assumes that the average child enters the labor force at age twelve and receives an entering income of approximately one fourth the national average. His expected income then increases with maturity and gains in productivity up to the national average at the age of 20. Assuming a horizon of age 55, his income will continue to increase with gains in productivity (assumed to be .04 per year) from age 20 to 55. A correction has been made for the probability of survival over time. An important assumption is that the costs of child rearing before age 12 are offset by the consumption benefits of children to parents. A detailed discussion of the derivation of the present value of lifetime earnings is given in the appendix to the economic analyse for the Expanded Program of Immunization in Indonesia (USAID Project Paper).

[5]It is assumed that the total time spent in care is 20% of the total number of ill days. The value of avoided time spent in family care of the ill is thus .2 times the number of cases prevented times the number of ill days per case per year multiplied by the shadow wage rate for female labor. The number of ill days avoided through program treatment is two less per case than the number of ill days avoided through prevention.

Annex

Economic Analysis

Table 6

Cost - Benefit Analysis of the Planned Malaria Program in the Outer Islands

(Assuming Six Days Lost)
(Rp. x 10^6)

Year		Program Costs[1]	Program Benefits[2]
79		4170	1956
80		4198	2700
81		5601	5342
82		6828	7090
83		5890	9340
Present value at 15% discount rate		17320	15955

Benefit/cost ratio at 15% discount rate = .92
Net present value at 15% discount rate = -1365
Internal Rate of Return = - 4 %

[1]See table 4, note that costs in 1983 are net of the value of capital remaining at the end of the planning period.

[2]See table 5, part A.

Annex

Economic Analysis

Table 7

Cost-Benefit Analysis of the Planned Malaria Program

in the Outer Islands

(Assuming Eight Days Lost)

(Rp. x 10^6)

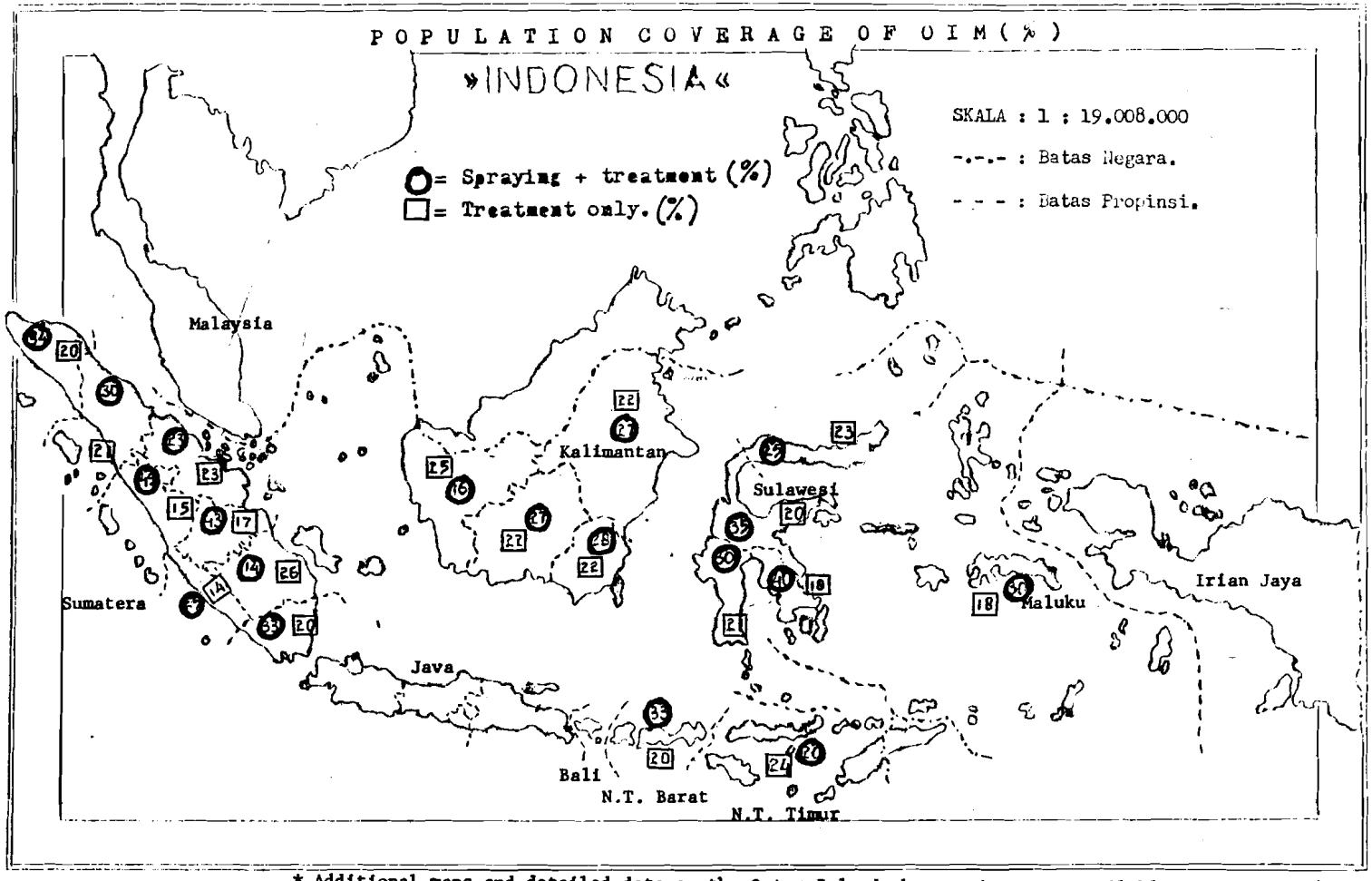
Year		Program Costs[1]	Program Benefits[2]
79		4170	2453
80		4198	3394
81		5601	6750
82		6828	8939
83		5890	11720
Present value at 15% discount rate		17320	20079

Benefit/cost ratio at 15% discount rate = 1.16
Net present value at 15% discount rate = 2759 ($6.7 million)
Internal rate of return = 25%

[1]See table 4, note that the costs in 1983 are net of the value of capital remaining at the end of the planning period.

[2]See Table 5, Part B.

ANNEX 9 *



* Additional maps and detailed data on the Outer Islands by province are available in the USAID/I, Office of Health and Nutrition and in the GOI, MOH/VBD Office.