

614.532
A265

9310903

9310903 ④
PO-ATL-968-C1



Auditor General

62p

MALARIA ERADICATION PROGRAMS

A. I. D.
Reference Center
Room 1656 NS

Audit Report Number 76-348

Issue Date May 7, 1976

Area Auditor General, Washington
Agency for International Development
Washington, DC 20523

AUDIT REPORT

MALARIA ERADICATION PROGRAMS

A.I.D.
Reference Center
Room 1656 NS

Period Covered: January 1, 1973 to
December 31, 1975

Audit Report No: 76-348

Date Issued : May 7, 1976

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
SUMMARY	2
STATEMENT OF FINDINGS AND RECOMMENDATIONS	3
A. The Resurgence of Malaria	3
B. The Causes of Malaria Resurgence	5
C. Antimalaria Programs and Economic Growth	9
D. Reduction of Bilateral and Other Donor Technical Assistance to Malaria Programs	12
E. International Malaria Eradication Training Center (METC), Manila	15
F. AID Malaria Research Activities	16
G. Review of Malaria Programs in Selected Countries and Regions	19
BACKGROUND AND SCOPE	20
EXHIBIT A - Latin America	24
EXHIBIT B - Tropical Africa	27
EXHIBIT C - Brazil	29

	<u>Page</u>
EXHIBIT D - Ethiopia	31
EXHIBIT E - Haiti	34
EXHIBIT F - India	37
EXHIBIT G - Indonesia	42
EXHIBIT H - Nepal	44
EXHIBIT I - Pakistan	48
EXHIBIT J - Thailand	53
EXHIBIT K - List of Recommendations	55
LIST OF REPORT RECIPIENTS	56

ACRONYMS

CDC	- Center for Disease Control (Atlanta, Georgia)
CEM	- Campaign for Eradication of Malaria
DDT	- Dichlorodiphenyl trichloroethane
GAO	- General Accounting Office
GOB	- Government of Brazil
GOE	- Government of Ethiopia
GOI	- Government of Indonesia
GON	- Government of Nepal
GOP	- Government of Pakistan
ICA	- International Cooperation Administration
IMRT	- Independent Malaria Review Team
MEP	- Malaria Eradication Program
MES	- Malaria Eradication Service
METC	- Malaria Eradication Training Center
NMEO	- Nepal Malaria Eradication Organization
NMEP	- National Malaria Eradication Program (India)
PAHO	- Pan American Health Organization
PASA	- Participating Agency Service Agreement
PHS	- Public Health Service
SMF	- Special Malaria Fund
SNEM	- Service National d'Eradiation of Malaria (Haiti)
SRT	- Strategy Review Team
SUCAM	- Superintendency of Public Health Campaign (Brazil)
TA/H	- Bureau for Technical Assistance, Office of Health
TDL	- Technical Development Laboratories (Atlanta, Georgia)
UNICEF	- United Nations Children's Fund
WHO	- World Health Organization

DEFINITIONS

Two concepts of malaria campaigns must clearly be distinguished: malaria control and malaria eradication. Malaria control implies the reduction of the disease to a level at which it is no longer an important public health problem, with continuous maintenance of the activity that produced this result. Malaria eradication differs radically from malaria control since its primary aims are the cessation of transmission of malaria, the elimination of the reservoir of infection and the prevention of resumption of transmission, all within a specific time limit. For other differences between the two approaches see the Sixth Report of the WHO Expert Committee on Malaria (1957). An eradication program is developed along two main lines of activity: (1) operations supported by the necessary administrative organization; and (2) epidemiological assessment of conditions existing before the commencement of the program, followed by an evaluation of its progress.

The following terms pertaining to the stages of malaria eradication are used throughout this report:

Preparatory phase (1-2 years) - establishes the antimalaria organization and completes the initial staffing, training, health education, logistical arrangements, epidemiological surveys, and geographical reconnaissance. All of these activities continue in the later phases, together with special investigations as problem areas are revealed.

Attack phase (3-4 years)- interrupts malaria transmission, mainly by DDT domiciliary spraying. In early attack, malariometric surveys provide evaluation and guidance of operations. In late attack (after reduction of malaria prevalence to less than 5%), total coverage by case detection and treatment services (surveillance) is established. This phase ends when malaria incidence is reduced to .01% and other criteria are met. General spraying coverage is then withdrawn.

Consolidation phase (3-4 years) - continues and intensifies surveillance to eliminate the malaria reservoir, with epidemiological investigation and focal remedial measures for each discovered case. This phase ends when adequate surveillance has shown no indigenous malaria problem for three consecutive years (the eradication objective).

Maintenance phase - provides a permanent vigilance system, integrated into the general health services, to prevent the re-establishment of malaria transmission after eradication is achieved. This protective coverage must be carefully adjusted to the receptivity and vulnerability of each area to the reintroduction of malaria.

AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

MALARIA ERADICATION PROGRAMS

INTRODUCTION

The discovery and development of dichlorodiphenyl trichloroethane (DDT) during World War II provided the first effective weapon against the mosquito and malaria, and the first real promise of malaria eradication. Because of the long residual potency of DDT, mass spraying of houses in malarious areas became feasible, and the interruption of malaria transmission became a realistic possibility. It was already known that by breaking the reinfection cycle of malaria victims the disease would gradually go into remission and die out. On the basis of careful study, malaria experts began to talk seriously of world-wide malaria eradication. In 1955, the World Health Organization (WHO) established eradication as a world-wide policy.

The world-wide malaria eradication program (MEP) is a coordinated effort of participating governments. The World Health Assembly, the governing body of the WHO, sponsors the program. The other major implementing agencies have been AID, the Pan American Health Organization (PAHO), United Nations Children's Fund (UNICEF), the United Nations Development Program (UNDP), and the U.S. Public Health Service (PHS).

AID assistance to malaria programs dates from the early 1950's. The United States has provided almost \$600 million in bilateral assistance to malaria control and malaria eradication programs in 36 countries. Total U.S. assistance to malaria programs in more than 90 countries has gone over the \$1 billion mark.

Current AID policy on malaria is restated and clarified in AIDTO Circ A-733 dated July 3, 1973, as follows: AID policy provides for selective assistance to country malaria programs, where the criteria for country programs are met. The major elements of this policy, restated are:

- (1) To provide for selective assistance to world-wide malaria programs on a case-by-case basis when a country demonstrates its own interest and concern for malaria through the provision of an adequate budget and staff to carry out the program.

(2) AID will continue to provide commodity support, funding of local costs in special cases where appropriate, and cooperation with WHO on evaluations.

(3) AID will continue to rely on WHO to provide scientific advisory services to LDC malaria programs including the assignment of advisors as required in such specialties as malariology, epidemiology, parasitology, entomology, sanitation, engineering, and health education.

(4) AID will consider on a case-by-case basis, the interim provision of administrative management/logistics advisors to country malaria programs. The provision of such assistance need not, however, be tied to AID-financed commodities.

SUMMARY

Endemic malaria has recrudesced in many places where the disease was either controlled or virtually eradicated. The malaria situation continues to deteriorate in many parts of the world and will worsen unless firm action is taken by governments to halt the resurgence of the disease.

We conclude that the program machinery to combat malaria on a global basis has largely been disassembled. For example, the AID policy of relying on WHO rather than AID for providing technical assistance (multilateralization) resulted in a net decrease in needed technical advisory assistance to affected countries. While most countries continue antimalaria activities at some level, the overall attack on malaria has dropped to a very low level. As a result, the potential for re-emergence of malaria as a major hindrance to development is again a significant possibility.

Failure of most countries to integrate the malaria service into the rest of the health system left technicians and workers alike without job security or career potential. As a result, many thousands of trained and experienced malaria specialists left the malaria service to seek other jobs and careers. In addition, closing of the International Malaria Eradication Training Center in Manila, Philippines, has further contributed to an already critical shortage of replacements for senior technical and administrative personnel who had left the program.

Major donor assistance by AID to malaria eradication programs has steadily declined over the past seven years. These reductions were

due to increasingly tight overall AID budgets, assumptions that the downward trends of malaria would continue, and new program priorities for the shrinking AID funds and manpower.

In the past, economic gains have been derived from antimalaria programs. Further economic gains are dependent on reversal of the downward trend of assistance to malaria eradication programs. There is no easy solution to achieve the goal of malaria eradication but obviously a method to provide broad-based support for world-wide antimalaria programs is needed.

AID's most dramatic malaria research project is the search for a malaria vaccine, the need for which is becoming more urgent every year. Research at several laboratories including the AID project at the University of New Mexico has demonstrated the biological feasibility of immunization against malaria. As a result of work done in the University and other laboratories, the question no longer seems to be whether vaccination is possible but whether techniques for mass production can be developed. AID has expanded its efforts by developing a collaborative network of seven laboratories focusing on mass production methods as well as developing and testing vaccines. We believe that AID should continue to give this worthwhile project a high priority.

We recognize that AID top management determines the application of Agency resources and sets priorities. We believe that our review brings out a world-wide need having a great impact on almost all other Agency world-wide efforts and management may wish to weigh the effect of this need on other programs. We do not believe that we can logically make firm recommendations in the area of Agency priorities and policy.

We have, therefore, posed three recommendations to the AA/TA that suggest consideration of: (a) assembling a task force to review the world-wide problem and make recommendations, (b) coordinating with other organizations regarding establishment and administration of a revolving loan fund for world-wide programs, and (c) the feasibility of establishing an international training center for training of professional malaria specialists and program managers.

STATEMENT OF FINDINGS AND RECOMMENDATIONS

A. The Resurgence of Malaria

Approximately 1.35 billion people formerly living in malarious areas are now free of the disease. About 75% of the population of previously

malarious areas now live where the disease is virtually unknown. However, today there are more than 480 million people who have virtually no protection from malaria; and the number is growing. These people live in the highly endemic malarious areas of the world: the undeveloped or developing tropics of Central America, Brazil, Colombia, Ecuador, Bolivia, Tropical Africa, large parts of the Middle East, India and the whole of Southeast Asia, Sri Lanka, Malaysia, and New Guinea.

Millions of dollars have been invested in antimalaria programs since the results of AID's first world-wide review of malaria eradication efforts were published over 15 years ago. There has been some success but for the most part premature termination of support to a number of programs has contributed to the return of the disease. Additional millions of people are being added to the current population of vast areas where malaria is not yet under control. If allowed to continue, this situation will retard the rate of economic growth in the affected areas over the next decade or more.

But the most distressing problem of all is the return of endemic malaria to areas in which the disease was either controlled or virtually eradicated. Here are some examples:

- (1) In Pakistan, the incidence of malaria is rising at an alarming rate--over 600,000 cases in 1973, over 10 million in 1974. There are fears the disease will rise to rates affecting 40% to 50% of the population;
- (2) In India, the incidence of malaria rose from 700,000 in 1970 to 2.5 million cases by 1974. Malariologists predict 10 million cases by 1978 if transmission of the disease continues unchecked;
- (3) Indonesia reported about 300,000 cases of malaria in 1972. However, in view of inadequate case detection, conservative estimates are that more than seven million actually had the disease; and the incidence is rising;
- (4) During the past five years, malaria rates in Thailand have risen 300% overall, and 600% in areas formerly freed of malaria. There is fear that malaria may return to hyper-endemic levels in many parts of the country;
- (5) Malaria rates have risen alarmingly in Nepal. During 1974, areas containing about two million people reverted to the attack phase of malaria eradication. The number of cases continued to rise throughout 1974;

- (6) Malaria incidence is continuing to rise in Haiti - from 2,500 reported cases in 1968 to 26,000 in 1972. Actual rates are many times higher due to inadequate control of testing and diagnosis, and lack of symptoms due to limited immunity;
- (7) Pre-eradication programs in 17 countries of Tropical Africa were phased out due to slow progress; malaria teams were disbanded and organized antimalaria activities were progressively reduced. The WHO estimates there are over 200 million cases of malaria annually in Africa.

Currently, AID support to malaria eradication programs consists of grant assistance to Haiti and Nepal, and loans to Ethiopia, Indonesia, and Pakistan. Grant assistance to Zaire is under consideration. Centrally funded activities include contracts for the development of a malaria vaccine and biodegradable substitutes for DDT.

UNICEF had practically phased out its assistance by 1973. UNICEF still supports the development of basic health services in some countries and helps supply them with antimalaria drugs.

PAHO has greatly reduced assistance to antimalaria programs for lack of funding, including a substantial reduction in technical advisory services.

The WHO continues to provide advisory services and limited funding to antimalaria programs in countries requiring such assistance.

We conclude that the program machinery to combat malaria on a global basis has largely been disassembled. While most countries continue antimalaria activities at some level, the overall attack on malaria has deteriorated to a very low level. As a result, the potential for re-emergence of malaria as a major hindrance to development is again a significant probability.

B. The Causes of Malaria Resurgence

No single factor can be cited as the one most significant cause of failure in those countries which have either failed to achieve eradication or failed to maintain it. We have, however, identified a number of the factors existing in a majority of antimalaria programs that failed to achieve their goals.

1. Overconfidence

Sri Lanka is perhaps the best example of scaling down their program too soon and too much. Early success led to an almost euphoria. In 1963 there were only 18 cases of malaria; by 1969 it had skyrocketed to more than .5 million; and Sri Lanka is only slowly recovering from the situation. They were simply unprepared for recurrence.

The situation is less dramatically illustrated in many countries where malaria recurrence is currently a problem. Areas under the attack phase were converted to consolidation phase too soon; surveillance was inadequate. Overconfidence led to an early phase-down and de-emphasis of the entire program of eradication as a national priority.

2. Changeover of Malaria Control Program

From 1958 AID's policy, like that of WHO and UNICEF, was to support only antimalaria programs that undertook eradication as a goal. As a result, many countries changed the objective of their program from control to eradication, but it required the collaborative efforts of AID, WHO, and national governments and often many years to adequately plan and implement eradication programs. Under these circumstances, time-limited eradication on the optimistic schedule originally adopted in many countries was never a serious possibility. Serious problems did develop when any attempt was made to move into a consolidation phase. The infrastructure for surveillance and detection was too weak to prevent sporadic outbreaks and continued transmission of malaria.

3. Resistance to Insecticides

Unrestrained use of DDT for agricultural purposes has resulted in almost total resistance to DDT by mosquitoes in the Pacific Coastal areas of Central America. Other areas are showing increasing resistance, and though not as serious, the effectiveness of spraying operations using DDT alone is steadily diminishing in some areas.

Alternative insecticides, in addition to being three to five times as expensive as DDT, require more careful handling and storage, may be more toxic than DDT, and have a shorter residual life on walls and ceilings. The result is a rapidly escalating cost of spraying operations, and curtailment of programs.

4. Inflation and Availability of Supplies

Malaria programs in less developed countries are particularly susceptible to inflation and world shortages of supplies since most

of their insecticides and other supplies are imported. The escalating price of petroleum products has generated higher operating costs as well as periodic shortages of insecticides at critical times.

5. Development Projects

Paradoxically, success of many development projects has resulted in higher susceptibility to malaria. Extensive agricultural programs and construction of roads have created more favorable conditions for movement of laborers between endemic and nonendemic malaria areas. Thus, the human malaria reservoir has become mobile, defeating the efforts of malaria teams to concentrate their attack on isolated focal points of infection.

Construction of irrigation ditches, fish-raising ponds, and reservoirs for water systems have created new breeding areas for mosquitoes. This has also brought the new breeding areas closer to communities, increasing the risk of malaria transmission.

Construction of dams, levees, and drainage canals have created large concentrated breeding areas for mosquitoes close to urban areas, and increased the risk of other mosquito-borne diseases such as filariasis and encephalitis.

Development of new forestry and mineral resources has brought a human reservoir for malaria to areas too remote to be considered a malaria problem a decade ago. Spraying operations are not usually effective in these areas because of the crude, temporary types of shelters. The labor force is usually transitory, returning periodically to villages or communities some distance from the work site. The potential for reinfesting large areas that were formerly free of malaria is very great.

6. Professional Staff and Field Personnel

There is a world-wide shortage of trained and experienced malaria personnel. A major difficulty for governments is to find enough competent and experienced technicians and field supervisors to run their programs, and to train other technicians and supervisors.

During the 20 years that malaria eradication programs were at their peak, several hundred medical officers, entomologists, and operational personnel were trained in international training centers. Thousands of auxiliaries and technicians were trained in national training centers. Unfortunately, malaria courses were based on the

highly specialized techniques of eradication technology, and did not provide the trainees with the broader aspects of a full specialty. Therefore, they did not gain the professional status and recognition to assure a suitable career in the country's health system.

In addition, failure of most countries to integrate the malaria service into the rest of the health system left technicians and workers alike without job security or career potential. As a result, many thousands of trained and experienced malaria specialists left the malaria service to seek other jobs and careers.

7. International Malaria Eradication Training Center

By the latter half of the 1950's, the dramatically increased interest in malaria programs had created an acute need for technically trained personnel. Only a limited number of specialists trained in tropical medicine or malariology were available to implement the rapidly accelerating programs.

A training center was established by AID in Jamaica, and later moved to Manila when malaria eradication was achieved in Jamaica. Over 1,800 professional and technical personnel from 45 different countries were trained during the life of the two facilities.

AID support of the training center was phased out in mid-1971 as part of the move toward less operational involvement in malaria activities. WHO agreed to undertake the additional advisory and administrative responsibilities in cooperation with the Philippine Government. In late 1972, WHO found they could not continue support of the facility and it was closed June 30, 1973.

The facility was the only remaining international training center for senior professionals engaged in malaria programs. Closing of this center has further contributed to an already critical shortage of replacements for senior technical and administrative personnel who had left the program.

8. Inadequate Case Detection

To successfully move the malaria eradication program from the attack phase to the consolidation phase requires an effective system of blood-sampling and case detection. In many countries, the programs were moved into the consolidation phase without an adequate system of surveillance and thus recurrences of malaria went undetected until a serious outbreak occurred.

9. Inadequate National Commitments

The causes of malaria resurgence have been very largely related to the unwillingness of national governments to make the requisite resources available when in fact such resources existed. Malaria has not often cost more than 5% of the health budget at a time when the health budget was rarely more than 5% of the total national budget.

Even where malaria cost as much as 50% of the health budget, however, these health budgets remained a relatively small proportion of available national resources. The problem is directly related to the inadequacy with which governments have analyzed their total public and private resources and the comparable inadequacy of defining the importance of malaria within national priorities. While technical advisory assistance is essential, while research is essential and while the manufacture of commodities such as insecticides will be required from countries overseas, the foreign exchange costs and local support costs are not entirely beyond the capacity of many countries. Necessary to avert this condition is more adequate national health planning which identifies malaria as a key national problem.

RECOMMENDATION NO. 1

The AA/TA should consider assembling a task force of malaria experts to: (a) review the scope and seriousness of the world-wide malaria problem; (b) determine the adequacy of planning by affected countries for a malaria program within the context of a national health plan; (c) determine the adequacy of affected countries to mount a national health planning process in order to fully consider malaria in the context of all national priorities; and (d) make recommendations to the United States and other involved governments, addressing the most feasible approach to combat malaria.

C. Antimalaria Programs and Economic Growth

While any disease control program will tend to have effects upon morbidity, mortality, and longer life expectancy, and therefore is contributive to increase in population growth, the Health Office has always advocated that developing nations maintain strong fertility control programs in parallel with disease control programs. There is no argument on the objective of achieving both low mortality and low fertility. This report deals with the effects of population quality rather than population quantity but the close interrelationship of the two programs is clearly recognized.

The effect of malaria on economic growth and social conditions has long been recognized by the leaders in the battle against this disease. The 1960 report by the International Cooperation Administration (ICA) Expert Panel on Malaria stated that malaria is notorious for its effect on population growth, this effect occurring not only through excessive mortality but also through reduction in fecundity. Because of the debilitating effects of malaria, education is stagnated; and production of goods and services is reduced to a below-subsistence level. The panel concluded that malaria eradication is a start toward breaking out of the vicious cycle of disease: ignorance - poverty - disease.

The WHO Expert Committee on Malaria, in its Sixteenth Report issued in 1974, identified the following adverse effects of malaria on developing countries. These can be assessed by estimating the cost of the disease to the community under a number of selected categories:

- (1) Actual expenditures of the government on treatment of malaria;
- (2) Loss of income by adult malaria patients;
- (3) Reduction in productivity;
- (4) Effect on education;
- (5) Effect on tourism;
- (6) Effect on special development projects through national and international efforts.

The major impact of malaria is morbidity - sickness. Recurrent bouts of debilitating illness last seven to 21 days, progressively sap energy, create an energy demand twice that of normal daily labor, and make agricultural labor grossly inefficient. Just as malaria has a deterrent effect on economic growth, so do antimalaria programs contribute to greater economic activities in previous malarious areas. The following are typical examples:

In Ethiopia, new areas were opened up for large-scale settlement and two large sugar plantations, cotton plantations, a paper mill, and a meat processing plant were established in areas where malaria was controlled.

In Brazil, increased settlement took place in Sao Paulo, construction of the Trans-Amazon Highway was facilitated, and agricultural colonies

were established along it. Increased development took place in the northeast area of Brazil.

In Central America, the major agricultural development of the Pacific coastland, primarily cotton, occurred after malaria transmission was reduced.

The malaria eradication project in Sri Lanka opened a wide area of land to economic use. By 1954, over 128,000 acres of jungle land had been brought under irrigation and settled by 91,000 previously landless people.

Until 1949, attempts to settle and develop parts of northern India were fruitless, owing to the high incidence of malaria. As malaria disappeared in the area under control, new settlements increased the population by 73%, while the area of cultivated land increased from 39,000 acres to 162,000 acres. The value of land increased from nil to about \$42.00 per acre; production of food grains from 139.2 million pounds to 182.7 million pounds.

In 1967, WHO stated that increased production of certain cereals, cash crops, and coal, although resulting primarily from increased use of technology, would not have been possible without malaria eradication. The average economic gain per year, comparing the period 1945 - 1953 and the period 1961 - 1965, had been estimated at \$1.47 billion. Assuming that only 10% of that figure was attributable to malaria eradication, the economic gain due to the malaria program would approximate \$147 million per year.

The antimalaria program in the Philippines has contributed to: (1) extension of agriculture into formerly malarious areas; (2) construction of roads; (3) rise in productivity; (4) creation and development of cottage industries; and (5) development of commerce in rural areas. During the period 1952 - 1972, the Philippine economy made significant progress. The Gross National Product increased about four times the 1947 level and continued since 1967 at about 5% to 6% annually. An important element of this high rate of growth has been the cultivation of new lands and the exploitation of forest and mineral resources in formerly malarious areas.

Opening up new agricultural areas in the Philippines created a demand for more agricultural labor. During the 15-year period from 1956 to 1971, the total employment in all sections rose from 7.7 million to 12.5 million, for a growth rate of 62%. Of the 1971 total of about 13.2 million employable persons, about seven million were in agricultural occupations. The implication is that the absorptive capacity of the agriculture sector contributed to the ability of the economy to absorb the yearly increase in the labor supply.

The number of hectares under rice cultivation in the Philippines increased from 1.43 million in 1920 to 2.21 million by 1950, and to 3.3 million by 1960. It was during the period 1950 - 1960 that malaria eradication was introduced in the Philippines. The control or eradication of malaria in rice cultivation areas can be said to open the way for development and expansion and assist in maintaining healthy working conditions which are favorable to better yields, permanent settlement of growers, and capital investment in improving production. In the Philippines the antimalaria program was an integral part of the national development.

In Pakistan, following the implementation of malaria eradication in 1962, there was a marked increase in the total production of rice and wheat. In five major rice and wheat growing districts in Pakistan, total rice and wheat production in 1962 was 1.3 million tons. In 1965, total production was 1.6 million tons, an increase of about 23%.

In Greece, the nationwide malaria control program conducted between 1946 and 1951 reduced malaria incidence from an annual average of about two million cases to an estimated 10,000 in 1959, adding at least 30 million man-days a year to the economy. Annual rice production rose from 5,000 tons to 15,000 tons between 1948 and 1955.

Nepal was able to settle barren tracts of land that had been uninhabited and uncultivated. People were previously afraid to settle on these lands because of the danger of malaria.

D. Reduction of Bilateral and Other Donor Technical Assistance to Malaria Programs

Major donor assistance by AID to malaria eradication programs has steadily declined over the past seven years. These reductions were due to increasingly tight overall AID budgets, assumptions that the downward trends of malaria would continue, and new program priorities for the shrinking AID funds and manpower.

The following subsections highlight the reductions in donor assistance to world-wide antimalaria programs:

(1) The PHS expectations of administrative flexibility and freedom to carry out a fully-supported, all-out attack to complete AID's malaria program did not materialize as anticipated. Following the signature of the Participating Agency Service Agreement (PASA) in March 1966, Congressional appropriations to AID steadily decreased, severely restricting grant funds. AID budget restrictions reduced field personnel. Certain missions were unable to support the minimum number of technical advisors recommended by PHS.

Prior to 1973, prevailing economic development theory in AID assumed that social benefits would automatically follow economic growth. Consequently, concentration of AID programs featured economic development projects rather than social effects projects. It is only within the last several years that the Agency has reversed its position to accept the social and political importance of equalization and social equity. It is now more fully recognized that sharing the benefits of development does not automatically occur because of economic growth. It is a difficult task which must be carried out simultaneously with the growth of development resources.

In December 1972, PHS notified AID that, in keeping with the policy of multilateralization as announced by AID in August 1970, they would progressively reduce the number of personnel from 44 technicians and advisors assigned to 18 Malaria Eradication Projects to not more than five in three countries by June 30, 1973. Under the multilateralization policy, it was anticipated by AID/W that some of the technical advisory positions established by WHO would be filled by U.S. technicians transferred to WHO. AID's inability to secure transfers of these advisors from PHS to WHO resulted in a loss of their expertise and experience to world-wide malaria programs. Subsequently, arrangements were made for transfer from AID to WHO, but so few malaria advisors remained on the rolls that only two were transferred.

(2) AID's multilateralization policy implemented a major trend in U.S. Foreign Assistance toward reduction of overseas U.S. personnel in bilateral assistance programs, and increased utilization of multilateral agencies for development programs. AID's new malaria policy was to look to WHO to take greater responsibility for most technical assistance to host governments in their antimalaria programs.

WHO had indicated willingness to assume increased responsibility for technical advisory services and was prepared to work cooperatively toward assumption of the advisory services as fully and as early as possible. AID agreed to continue to support research, commodities, local costs, and evaluations and to work with other U.S. agencies toward strengthening WHO's capacity to provide advisory services and meet other responsibilities.

AID had anticipated that the 1970 agreement between AID and PHS would provide for PHS to continue field staffing and headquarters backstopping services to country programs until assumption of these responsibilities by WHO. However, the PHS terminated this agreement early and began a large-scale reduction of its technical advisory positions overseas. In addition, multilateralization was further diminished as an effective policy by WHO's reduction of field advisors from 112 positions to 75 positions.

(3) UNICEF assistance in the field of malaria was mostly in Latin America and Asia. During the period from 1958 through 1968, this organization expended \$65 million, primarily for commodity support. UNICEF did not provide technical assistance except in vehicle maintenance. A decision was made in 1970 to terminate support to malaria programs by mid-1973.

(4) The Pan American Health Organization (PAHO) was active in supporting malaria programs in Latin America for many years. A large part of the funds for PAHO's program requirements came from their Special Malaria Fund (SMF) to which AID was a major contributor. In 1966, PAHO was notified that AID intended to phase out its contribution to the fund. An agreement was reached by PAHO, AID, and other involved offices that malaria programs would be funded out of the regular PAHO budget plus other resources from WHO.

Meanwhile, due to budget restrictions, the AID Latin America Bureau pressed for accelerated phase-out of its contributions to the SMF. The Bureau subsequently announced that it would contribute \$1.5 million in 1968, \$1 million in 1969, and \$500,000 in 1970, terminating any further contributions.

The reduction in expected funding level caused PAHO to undertake strict economies as they were unable to move obligated funds from other projects to malaria. The staff of about 140 in-country programs was reduced in a period of three years to about half that number, in part due to over-reliance by PAHO on U.S. voluntary contributions to the SMF.

In the previous section of this report we have shown the economic gains to be derived from antimalaria programs. Further economic gains are dependent on reversal of the downward trend of assistance to malaria eradication programs. There is no easy solution to achieve the goal of malaria eradication but obviously a method to provide broad-based support for world-wide antimalaria programs is needed.

RECOMMENDATION NO. 2

The AA/TA, in coordination with the USPHS, WHO, UNICEF, and PAHO, should consider establishing and administering a revolving loan fund for antimalaria programs, and soliciting contributions from other involved nations and/or organizations (e.g., United Nations Development Program).

E. International Malaria Eradication Training Center (METC), Manila

By the latter half of the 1950's, the dramatically increased interest in malaria eradication and the substantial sums of money available for this work had created an acute need for technically trained personnel. Only a limited number of men trained in tropical medicine or malariology were available to implement the rapidly accelerating programs, and it was soon apparent that a training center was needed. It was felt that such a center should be located where English was spoken, malaria was prevalent, and a nationwide eradication program was in progress. Kingston, Jamaica was eventually selected as the site for the center. Almost 500 professionals received training at this center during its existence.

When malaria was eradicated in Jamaica, the center was closed. A new International Malaria Eradication Training Center (METC) was established in Manila. It provided specific training in malaria eradication and control activities to professional and technical personnel from countries engaged in antimalarial programs.

The Center trained 1,351 participants from 43 different countries up to the time it closed in 1973. United States support of the METC was administered for AID by the PHS Center for Disease Control under a 1966 PASA Agreement. This support ended on June 30, 1971, with a terminal grant to provide two years additional funding.

WHO agreed to undertake the additional advisory and administrative responsibilities beginning July 1, 1971, in cooperation with the Philippine Government. However, WHO was unable to provide the necessary funding from its budget. To assure the transition without interruption of vitally needed training, in 1971 AID provided \$257,000 in interim financing.

In late 1972, WHO notified the METC that they could not continue support of the facility and the Center was closed June 30, 1973. The USAID/Manila expressed deep concern over the closing of the Center. The Mission stated, "In view of the fact that this facility is the only international training center in the world for senior professionals engaged in malaria programs, its loss would be very harmful to continuing antimalaria efforts in the Philippines, and we presume to a number of other countries. Several countries in this region are making substantial investments from their health sector funds for ongoing malaria programs. The operation of these programs without trained senior technical and administrative personnel would be difficult. Replacement personnel need to be trained and advanced training is required to update knowledge and skills of older employees."

The WHO 1974 Report on Development of the Antimalaria Programs stated that "it is hard to believe yet it is a fact that there is presently a lack of trained and experienced personnel." According to the report, at the time of launching of the malaria eradication programs, many training centers were established at national and international levels. For nearly 20 years, several thousand medical officers and entomologists and thousands of auxiliaries were trained in these centers. WHO finds that now it is very difficult for governments to appoint staffs with experience in sufficient numbers to run the malaria eradication programs. WHO surmises that malaria eradication courses for professionals were based on requirements for the execution of a malaria eradication program. Therefore, the courses did not provide medical officers with the broader backgrounds of a full specialty that could have secured their careers within country health services through recognition of their status. WHO believes that this was probably one of the major reasons for the tremendous turnover of professional staff of the national malaria eradication services.

Malaria advisors within the AID/W Office of Health stated that an international malaria eradication training center located in the tropics was essential for successful conduct of AID's current anti-malaria program in the Near East and South Asia.

RECOMMENDATION NO. 3

The AA/TA, in coordination with other agencies as deemed appropriate, should consider the feasibility of establishing an international training center for the training of professionals to manage antimalaria programs.

F. AID Malaria Research Activities

AID's most dramatic malaria research project is the search for a malaria vaccine, the need for which is becoming more urgent every year. The world-wide MEP had greatly reduced the overall malaria level by the end of the 1960's. However, by the early 1970's, malaria was again increasing at an alarming rate in many countries. The cause was due largely to administrative, financial, and operational problems, including those brought on or aggravated by natural catastrophe and political instability. These problems delayed the implementation of programs, allowing time for the development of mosquito resistance to insecticides and parasite resistance to anti-malaria drugs. Because of these and problems in other areas, it may not be possible to repeat the earlier successes in sharply reducing levels of malaria in two to three years. Progress now will

be slower and more costly; protection of past gains more difficult. An effective vaccine would provide new methodology with great potential significance to antimalaria programs.

AID support of the Malaria Immunity and Vaccination Project dates from 1966. From the beginning, the project objective has been the development of a vaccine for use against human malaria. It is the largest project of its kind anywhere in the world. Research has been conducted simultaneously on all of the approaches required for the development of a practical vaccine. In FY 1975, AID funding totaled \$1,052,000.

At the time this project was started, it was the general feeling that vaccination against malaria was impractical or impossible. This was due to numerous biologic complexities preventing the development of vaccines against other parasitic diseases. However, AID and its Research Advisory Committee decided that the attempt should be made in view of the potential world-wide benefits and the convincing scientific rationale presented in the project proposal. AID has recognized this as a high-risk project but one which, if successful, would have a tremendous beneficial impact throughout the world.

A research project in Malaria Immunity and Vaccination was conducted with AID support at the University of Illinois from 1966 to 1972. When the project was initiated, the mechanisms of malaria immunity, the routes of artificial immunization, and even the feasibility of malaria vaccination were far from clear. The Illinois project was accordingly designed on a broad spectrum of specific approaches to a malaria vaccine under the AID contract.

The research was conducted largely in experimental model systems of rodent malaria and mosquito vectors, leading into investigations of primate malaria as promising methods and findings were developed. The accomplishments included much basic work on the preparation, testing and comparison of antigens, a conclusive demonstration of the biological feasibility of malaria vaccination, and the establishment of priority lines of research.

The project was moved to the University of New Mexico in 1972 under a new three-year contract. This move was carried out with a transfer of key personnel and equipment, and a restructuring of the work plan toward increasing emphasis on antigen production and primate studies. A subcontract with the University of Illinois through FY 1973 provided an advantageous phasing of activities between the two universities. The University of New Mexico project has also developed a subcontract relationship with Rush University for research with human malaria species.

This background of AID-supported research has made significant contributions to the objectives stated above, and has opened ways for further advancement toward the goal of a malaria vaccine. This does not ignore or diminish the important research activities and findings of other laboratories. The AID-supported project remains unique, however, in endeavoring to bring together the expertise and facilities for a concerted effort in all necessary research elements from the foundational to the advanced studies and trials of malaria vaccination.

The latest progress report by the principal investigator for the University of New Mexico stated that the research has demonstrated it is feasible to vaccinate against malaria. As a result of work done in the University and other laboratories, the question no longer seems to be whether there will be a malaria vaccine, but only when. The work to date seems to have demonstrated beyond any reasonable doubt that immunization against malaria is biologically feasible.

This conclusion has been confirmed at a recent AID-sponsored workshop attended by leading scientists in the field of malaria. Whereas in the past many scientists questioned the feasibility of any antimalarial vaccine, the questions now being raised relate largely to timing, techniques for *in vitro* growth of malaria parasites, and techniques for mass production. This change in attitude is certainly due, in part, to the AID-sponsored malaria vaccine project. It not only demonstrated the feasibility of immunization but also stimulated a number of other scientists to carry out research along the same lines.

Research scientists have not been marking time while seeking to discover ways to prevent malaria. They also have concentrated on improving the method of controlling the spread of disease. For almost 20 years, AID and its predecessor agencies have supported the work of the Technical Development Laboratories (TDL) of the Center for Disease Control (CDC) run by the U.S. Public Health Service in Atlanta, Georgia. Under the Malaria Eradication Research Project, the TDL has undertaken: (a) improvement of insecticide formulations; (b) development of more efficient methods and devices for packaging and application of insecticidal materials; (c) exploration of nonconventional pesticidal compounds and biological agents; and (d) collaboration with international organizations in field evaluation and training in methods of malaria mosquito control. The significant accomplishments resulting from these AID-supported research activities have contributed to increased effectiveness and reduction of cost. AID funding for this project terminated in June 1972, but some of the research is continuing on a small scale under CDC funding.

Two malaria research stations were supported by AID through PASA's with the CDC at Atlanta, one in El Salvador and the second in Thailand.

AID funding for these projects was terminated in June 1972. The research unit in Thailand was phased out while the research station in El Salvador was continued under CDC funding. A memorandum dated January 29, 1973, commented that from its beginning, the El Salvador project anticipated a broad scope of technical investigations of malaria eradication techniques. These were expected to be concentrated on accelerated solutions of operational problems. The project experienced delays in selection and negotiation of the site, staffing and equipping of the station, and development and implementation of the work plan. Although basic research on parasites and vectors was carried out, it seems surprising that the project expended \$2 million in six years with little to report in actual achievement by way of finding solutions to operational problems in national malaria programs.

The Thailand Malaria Operational Research Unit in Bangkok was phased out completely. The memorandum commented that it was clearly a regrettable loss that an effective research program was not developed and continued as originally planned. The review gave the project the highest priority in terms of the need for finding practical solutions to the problems impeding malaria eradication. The findings of such a project based in Thailand could have great significance throughout the region where similar special problems are widespread. The project should not have been concluded without planning for a continuation of the research by the Thai Government, with international assistance as necessary.

G. Review of Malaria Programs in Selected Countries and Regions

The Director-General of the WHO issued a report, "Development of the Antimalaria Programme" in December 1974. This report was a summary of the WHO Executive Board's review of the global antimalaria program. It stated that the malaria situation had deteriorated in many parts of the world and further deterioration is imminent unless drastic measures are undertaken to stop the resurgence of the disease.

The present situation is a result of a complex interplay of factors, both operational and administrative, which led to the reduction of antimalaria operations. Undoubtedly the technical problems, such as insecticide resistance of vectors, and resistance of plasmodia to drugs, have affected the progress of certain programs. However, the main reasons for the slowing down of progress or even for the failures were of an operational and administrative nature. Inadequate resources, poor planning and management, and delays in program implementation have all greatly contributed to the situation as it stands today.

Exhibits A through J summarize reviews of malaria programs and progress in two regions (Latin America and Tropical Africa) and eight countries

(Brazil, Ethiopia, Haiti, India, Indonesia, Nepal, Pakistan, and Thailand). These ten reviews discuss in detail and support the presentation made in the body of the report.

BACKGROUND AND SCOPE

Background

The world-wide malaria eradication program was established in 1955 as a result of a policy statement by the World Health Organization (WHO). The following year, the U.S. International Development Advisory Board endorsed a program of world-wide malaria eradication, recommending all new as well as existing U.S.-supported malaria control programs be converted to eradication programs.

AID's mandate to support world-wide malaria eradication projects was presented in Section 420 of the Mutual Security Act of 1957. It said: "The Congress of the United States, recognizing that the disease of malaria, because of its widespread prevalence, debilitating effects, and heavy toll in human life, constitutes a major deterrent to the efforts of many people to develop their economic resources and productive capacities and to improve their living conditions, and further recognizing that it now appears technically feasible to eradicate this disease, declares it to be the policy of the United States and the purpose of this section to assist other peoples in their efforts to eradicate malaria." Subsequent Mutual Security Acts for the years 1958, 1959, and 1960 contained specific appropriations for Malaria Eradication Programs. There is no evidence that Congress or subsequent Presidents have withdrawn their support for world-wide malaria eradication.

During the period from 1957 through 1961, the malaria eradication program was managed by a centralized administration within ICA, AID's predecessor. In 1961 when AID was formed, operational functions were the responsibility of the regional bureaus within AID, and specific malaria eradication budgets were no longer submitted to Congress. In order to make use of U.S. Government resources with greater in-house research and training capabilities, the Agency decided in 1965 to request the U.S. Public Health Service (PHS) to administer the program. The PHS agreed to accept responsibility after AID made a firm commitment to support the then ongoing 15 country programs to completion. This agreement was formalized by the signing of a PASA on March 3, 1966. PHS assigned the administrative task to its National Communicable Disease Center, later renamed the Center for Disease Control (CDC), in Atlanta, Georgia. The PASA provided for PHS to assume responsibility for program policy, planning, and implementation, including

training, research, evaluation, and relationships with other agencies. All proposed actions were to be coordinated with the USAID missions and WHO, and mutually agreed to by PHS and AID/W. PHS furnished resident advisors; 39 USAID direct-hire malaria advisors continuing in the program were transferred to PHS.

The AID Malaria Eradication Branch remained as a central staff resource and assumed the responsibility of AID liaison requirements under the PASA. The responsibilities of policy determination and programming support remained with AID's regional bureaus.

By late 1969, the CDC employed 64 Americans working overseas, 47 of them in country programs. The CDC in Atlanta had 22 employees performing five basic functions: technical backstopping, training, evaluation, research, and procurement.

During this period the foreign aid program began losing Congressional support, and appropriations for foreign aid steadily declined. In July 1968, the Administrator for AID notified the Surgeon General of the PHS that the reduction in Congressional appropriations had placed major constraints on funds and ceilings for the malaria program.

By September 1969, a decision had been made to multilateralize the Agency's world-wide malaria eradication program. AID felt it necessary at the same time to resume those administrative and management functions for which facilities existed. Accordingly, all headquarters functions were transferred to AID/W.

In August 1970, a new memorandum of understanding between AID and the Department of Health, Education and Welfare was signed. Under the provisions of this agreement, AID agreed to assist WHO to assume greater responsibility for in-country administrative and technical advisory services, while starting an orderly withdrawal of U.S. technicians in overseas programs. This was to be the first step toward phasing out all bilateral technical advisory services.

AID's next step in August 1970, was to issue a policy statement to Mission Directors in countries where AID had bilateral malaria programs. The communicating airgrams stated that multilateralization was to take place as soon as a specific timetable could be established, and that WHO had indicated willingness to assume increased responsibility for technical advisory services and training. This policy was justified on the basis that the major trend in U.S. foreign assistance was toward reducing overseas U.S. personnel in bilateral programs while encouraging increased use of multilateral agencies for development programs.

Several key assumptions by AID were included in the airgram "AID Policy for Malaria Eradication Multilateralization of Technical Services" (AIDTO Circular A 1727, August 8, 1970):

(1) WHO had indicated willingness to assume increasing responsibility for technical advisory services and training;

(2) UNICEF would continue to concentrate on provision of commodities to certain programs;

(3) AID would consider interim provision of field staff assistance in the managerial areas where WHO was not able to provide such staff;

(4) The PHS would continue field staffing and headquarters back-stopping for residual U.S. advisory services to country programs during an interim period prior to assumption of these responsibilities by WHO;

(5) AID would continue support of research, commodities, local costs, and evaluation, and would work with other U.S. agencies toward strengthening WHO capacity to provide advisory services and meet other responsibilities.

In December 1972, PHS notified AID that the AID/PHS memorandum of understanding of August 1970 would be terminated effective June 30, 1973, because WHO and involved countries had shifted emphasis away from time-limited eradication; and since PHS would have advisors in only three countries by June 30, 1973, PHS continuation of technical and support services would be impractical.

The multilateralization policy of 1970, primarily covered technical services and specifically provided for "continuation of support in the context of foreign assistance policy to research, commodities, local costs and evaluation" and was restated (AIDTO Circular A-733 dated July 3, 1973) in substantially the same terms.

During the period between AID's announcement in August 1970 of its policy of multilateralization and the end of our review on December 31, 1975, AID's bilateral assistance was phased out in 16 of the original 18 country programs.

Scope

We have reviewed AID's current activities in malaria eradication programs. The examination covered primarily the period subsequent to December 31, 1972, the cut-off date of our prior audit. We took into consideration the most recent information available from the Officer of Health, Technical Assistance Bureau (TA/H) in Washington.

The purpose of our audit was to: (a) determine the effect of AID's reduced funding of malaria programs; (b) review the possible impact

of malaria resurgence on other economic and social development programs in formerly malarious countries; and (c) evaluate the effectiveness of multilateralization of the malaria programs.

{ We held discussions with malaria advisors in TA/H, reviewed documentation in that office's files, and reviewed Area Auditor General audit reports issued subsequent to December 31, 1972. The audit included such other auditing procedures as we considered necessary in the circumstances.

EXHIBIT A

Latin America

During the period from 1956 to 1959, malaria eradication programs were initiated in virtually all the countries of the Americas where malaria transmission was taking place. The initial results of the coordinated campaign were spectacular; by 1964 over 56% of the population in malarious areas was free of the disease.

There were 34 of 47 countries in the western hemisphere originally classified as malarious. Of these, 12 had interrupted malaria transmission before or during the coordinated eradication campaign. Eight countries are believed capable of eradicating malaria in their entire territories if transmission can be interrupted in bordering countries. The remaining 14 countries still have areas of persistent transmission.

Since 1965 progress toward eradication has slowed due to a number of financial, operational, and administrative restraints. During the nine-year period from 1964 to 1973, the number of persons freed from malaria has increased by only 12%. The reasons appear to be common to all currently malarious areas in Latin America.

(1) Unrestrained use of pesticides for agricultural purposes in the Pacific coastal areas of Nicaragua, El Salvador, and Guatemala has resulted in almost total resistance to most pesticides by mosquitoes in those areas. Other areas are showing increasing resistance, and though not as serious, the effectiveness of spraying operations using DDT alone is steadily diminishing. Alternative insecticides, in addition to being three to five times as expensive as DDT, require more careful handling and storage, are usually more toxic than DDT, and have a shorter residual life on walls and ceilings. The result is a rapidly escalating cost of spraying operations.

(2) Malaria programs in less developed countries are particularly susceptible to inflation since most insecticides and other supplies are imported. In addition, the escalating price of oil has generated higher operating costs and created periodic shortages of insecticides.

(3) Of the 14 countries which still have areas of persistent malaria transmission, AID had terminated assistance to antimalaria programs in six. Coincidental with the signing of a Participating Agency Service Agreement with the U.S. Public Health Service in March 1966, Congressional appropriations to AID began to decline, placing a severe restriction on grant funds. In addition, AID budget restrictions reduced the number of field personnel. As a result, certain missions were unable to support the number of technical advisors which the PHS recommended. Budget constraints ultimately led to placement of U.S. malaria advisors

in Brazil and Ecuador on loan funds, against PHS judgment. In Central America, where AID had supported six separate programs, the Latin America Bureau did not agree to approve grant funding for country advisors. This issue resulted in the removal of resident PHS country advisors from six countries for which PHS was responsible under PASA's. The Surgeon General indicated that the PHS could not be responsible for the outcome of programs where PHS was not permitted to post resident advisors.

AID's termination in 1970 of its annual contribution to PAHO's Special Malaria Fund forced PAHO to restrict funding for Latin American malaria programs. Over a three-year period, PAHO cut its total staff of 140 personnel in country programs to about half that number. Research, malaria conferences, and other activities were similarly cut back by PAHO.

In late 1971, the General Accounting Office (GAO) conducted a survey of U.S. assistance for malaria eradication in Latin America. The report noted that:

(1) AID's management of its bilateral assistance appears to have contributed to the lack of success in eradicating malaria because of separation of responsibility and authority between PHS and AID; division within AID over the use of funds; and lack of continuity and timeliness of the assistance given;

(2) Confusion appeared to exist as to how AID planned to contribute to malaria eradication programs;

(3) U.S. assistance did not appear to have included all resources available for programming or to have been directed towards the solution of such problems as development of basic health infrastructures; movement of people in and out of malarious areas; temporary housing; refusal of the people to take drugs; and increased mosquito resistance to insecticides. The Latin America Bureau maintained the position that assistance would be provided only where eradication is determined possible within a time-limited period, with the option to support programs which do not currently meet eradication criteria if the political, social, or economic value of the program merits support.

On the other hand, AID's Office of Health (TA/H) maintained that it was U.S. policy to support malaria control operations as a valid and necessary interim step. That AID, which has the authority and the mandate to assist in the world-wide malaria eradication program, should continue to support ongoing antimalaria programs in Latin America.

GAO concluded that the disagreement, which had been in progress since late 1970 between the Latin American Bureau and TA/H, had resulted in termination of assistance to antimalaria programs in virtually all of Latin America. There is persuasive evidence to support the argument that malaria eradication must be accomplished before significant development in agricultural and other programs can be achieved. The Philippines, Thailand, India, Pakistan, Nepal, Ethiopia, and Central America have at one time or another made major gains in acreage added or improved for purposes of food production. On the other hand, it has been known for many years that areas of hyperendemic malaria are usually bypassed for agricultural purposes.

The Secretary of State of the United States, on March 1, 1975, proposed the establishment of a Hemisphere Agricultural Consultive Group to increase Latin America food production. He announced that the administration would seek a contribution of \$1.8 billion to the Inter-American Development Bank under which the consultation group would operate. Its goal would be to generate annual food production increases in the range of 3.5% to 4%. Also included in the proposal were research centers on nutrition and food technology, jointly financed by the U.S. and Latin America countries, to further assist food production.

The FY 1975 submission to Congress for Latin America projected almost \$36 million in grant and loan assistance for food and nutrition projects in Brazil, Ecuador, El Salvador, Guatemala, Honduras, and Nicaragua. Malaria eradication has not been achieved in these countries, although AID terminated assistance to antimalaria activities in these areas over the past five years.

EXHIBIT B

Tropical Africa

Almost 290 million people live in the tropical area of Africa. For most of these people, there are no organized malaria eradication or control programs. The incidence of malaria in tropical Africa is estimated by WHO at 90% - 95% of the population. It is estimated that malaria is directly responsible for about one million deaths annually of infants and children below the age of 14. The Director-General of WHO estimated that there are over 200 million cases of malaria in Africa every year.

The 12 experts who comprised the ICA Expert Panel on Malaria concluded in 1960 that many factors impeded malaria eradication in Africa. In addition to the administrative chaos in the emerging independent nations, nomadism and labor migration, primitive housing, wide dispersal of farm plots, prolonged malaria transmission season, inadequate transport and communication, all complicate the effort to eradicate malaria. To these difficulties must be added the poverty of the people, the high rate of illiteracy, and the lack of trained technicians and experienced administrators.

While the malaria problem is significant in many regions of the world, in Africa the solution of the problem is fundamental to all progress. The panel recommended that ICA study the malaria problem of tropical Africa as a whole and cooperate with WHO in the development of a regional program. The panel further recommended that the U.S. take the initiative by creating an African Malaria Fund and seeking the participation of other nations. This specific recommendation was never implemented.

The Thirteenth Report of the WHO Expert Committee on Malaria related that sometime after 1951, malaria control pilot projects were launched in a number of countries. While all of them brought about a decrease in the amount of malaria, none of them indicated the possibility of an early interruption of the transmission of malaria. From 1961 onward, pre-eradication programs were implemented in 17 countries.

However, in view of the slow progress achieved in the development of health infrastructure, WHO suggested the termination of malaria projects and their conversion into projects for the development of basic health services. As a result, malaria teams were disbanded, malaria training facilities became underutilized, and organized antimalaria activities were progressively reduced or stopped.

In 1967, WHO stated that because many large-scale agricultural and industrial development programs received assistance from the United Nations, technical aid should be given to governments in undertaking effective antimalaria measures related to such development programs.

AID's Office of Health has identified a potential project for the development of low-cost methods of vector control in tropical Africa. WHO is taking the initiative to stimulate research and training on several endemic diseases, including: schistosomiasis, filariasis, malaria, onchocerciasis, leishmaniasis, and leprosy. However, their approach is a long-range one aimed at developing methods for drug treatment and immunization.

AID has recognized the urgent need for the development and testing of new methods of vector control and improvement of known methods with demonstration projects. The proposed project will put emphasis on the development of low-cost, self-help methods of preventing and/or controlling mosquito-borne diseases.

A team of specialists recently visited Nigeria and Kenya to study the feasibility of developing projects to achieve this objective. Several courses of action that may be identified by the team are:

- (1) A series of pilot or demonstration projects in one or more African countries utilizing known methods of mosquito control;
- (2) Development of a research program on new methods of mosquito control and/or improving the effectiveness of traditional methods;
- (3) Institutional development of a Malaria Center to conduct the necessary entomological, epidemiological, engineering laboratory, and field research.

The FY 1975 submission to Congress proposed about \$137 million in country and regional assistance to countries in tropical Africa, focusing on a limited number of basic development problems in agriculture, human resource development, transportation, health, and population. However, recent submissions to Congress have almost completely ignored the specific problem of malaria which has been proven a roadblock to economic development.

EXHIBIT C

Brazil

Brazil, with the largest population in South America living in malarious areas, has shown that a well-run eradication program can succeed. From a slide positivity rate of 16.0% in 1961, the Malaria Eradication Program (MEP) has brought the country-wide rate down to 3.39% in 1973.

The Brazil MEP goes back to 1938 when the Brazilian Government (GOB), with the financial and technical assistance of the Rockefeller Foundation organized the Antimalaria Service. The organization was formed to combat the severe epidemic outbreaks of malaria caused by the accidental importation of the African mosquito - *Gambiae*. An intensive program led to the elimination of this mosquito from Brazil in less than two years.

The evolution of Brazil's antimalaria programs continued through various organizations. In 1941, the National Malaria Service was established to undertake control activities in a more extensive area, but lack of financial support prevented satisfactory progress. From 1943 to 1947, the Special Public Health Service conducted antimalaria activities in the Amazon and Rio Doce Valleys.

In 1958, the MEP was organized under the authority of the National Department of Rural Endemic Diseases, and assistance agreements were signed between the GOB, AID, and PAHO. Between 1959 and 1964, yearly spray coverage increased from 163,000 to 5,171,000 houses; population protection increased from 623,000 to 9,662,000 people.

In 1965, a GOB decree created the Campaign for Eradication of Malaria (CEM), as a separate administrative, technical, and logistical entity within the Ministry of Health. In 1966, a comprehensive National Malaria Eradication Plan was written, with the goal of total spray coverage of all malarious areas by 1969.

In 1969, the Superintendency of Public Health Campaigns (SUCAM) was created, combining the activities formerly carried out by the CEM, the Smallpox Eradication Campaign, and the National Department of Rural Diseases. At the central level the chief of CEM was placed under the direction of the SUCAM Division of Campaigns.

In 1970 the malarious areas of the country were divided into two major areas:

- (1) The area of short-term eradication of malaria covers 1.8 million square kilometers and 32.2 million inhabitants, or 79% of the population in malarious areas of the country;

(2) The area of long-term eradication of malaria covers 5.1 million square kilometers and 8.4 million inhabitants, equivalent to 21% of the population in malarious areas of the country.

WHO and independent evaluation teams have recognized several significant factors contributing to steady program progress of Brazil's MEP. These are:

(1) Noteworthy efforts by SUCAM to achieve a much wider recognition of the importance of the Malaria Eradication Campaign and its contribution to the development of Brazil and to give it high priority within the vast program of SUCAM;

(2) The extraordinary role of CEM in support of highway construction and other public works to facilitate arrangements to obtain, coordinate, and utilize public and private resources in implementing drainage, filtration, and application of larvicides, etc.;

(3) Adequate funding throughout the history of the program. As a result, sufficient insecticides were available to carry out the spraying activities;

(4) Adequate response by management to recommendations of evaluation committees. Recommendations made by a 1971 evaluation team had been effectively implemented by SUCAM. The team stated that the substantial increase in financial and moral support, the recuperation of administrative flexibility, the closer association of the Superintendency with the highest levels of the Ministry of Health, and its capacity to obtain support of other institutions and to furnish leadership to personnel under its direction, have renewed the interest and enthusiasm in campaign personnel at all levels. This has resulted in improvement of both quantity and quality in carrying out operations.

Brazil has benefited from the MEP in increased settlements in the coastal area of Sao Paulo where malaria had previously acted as a deterrent. The control of malaria along the Trans-Amazon Highway facilitated the establishment of agricultural colonies. Also, the interruption of malaria transmission in the northeast area of Brazil has contributed to its development.

SUCAM/CEM has set 1980 as the year to attain their goal of reaching a malaria incidence of 0.5 malaria cases per 1,000 population. An evaluation commission conducted a comprehensive review of the MEP in mid-1973 and considered this goal to be attainable. The progress of this program in Brazil over the last ten years, the current strategy now being followed, the continued financial support, and the commitment of the GOB, have practically assured that eradication over the long term will succeed.

EXHIBIT D

Ethiopia

Malaria is Ethiopia's leading public health problem, existing in almost 70% of the land area and exposing about 50% of the country's 28 million inhabitants to the dangers of this disease.

Malaria investigations in the 1930's and the early 1950's led to pilot projects in the mid-1950's with AID, WHO, and UNICEF as the major donors. These pilot projects indicated that the eradication of malaria was feasible; and in 1959 the Government of Ethiopia (GOE) accepted malaria eradication as a national objective, creating the Malaria Eradication Service (MES) to implement that objective. In 1966, a joint MES/WHO study led to the formulation of a 14-year Plan of Operations for Eradication of Malaria, spanning 1966 to 1980.

To carry out the eradication program, the country was divided into four geographic areas (A,B,C, and D) of three to six zones each. The zones were subdivided into five to seven sectors covering 100,000 - 150,000 people each. The four areas were to undergo a four-phase program comprised of a two-year preparatory phase, followed by a four-year attack phase, a three-year consolidation phase, and a maintenance phase of indefinite duration. The whole country was to be covered in successive stages by 1972. The attack phase for Area A began in 1966, and the preparatory phase in Area B was initiated in 1968.

In 1970, a Strategy Review Team (SRT) composed of experts from the GOE, WHO, AID, and USPHS assessed the program. Their report compared the planned and actual phasing of the program in the four areas. They found there had been substantial slippage in the progress of the program, and that financial constraints had seriously affected the operation of the program. Beginning in FY 1968, the MES experienced difficulties obtaining funds due to the less favorable economic situation of the country and changes in the funding patterns. Also, there were lengthy delays in delivering funds that had been approved in the budget, resulting in late payments of allowances and salaries to the field staff. This caused late execution or non-execution of seasonally critical activities vital to eradication programs.

The SRT's seven recommendations are briefly summarized as follows:
(1) Maintain gains already achieved by continuing DDT spraying operations in a more discriminating manner; (2) conduct intensive antimalaria activities in agricultural or other development areas in all parts of the country; (3) base the timing of DDT spraying on epidemiological considerations; (4) use case findings in areas under antimalaria activities to evaluate trends in malaria incidence and detect epidemics; (5) integrate the MES and the Basic Health Service as soon as possible;

(6) undertake a definitive study to determine whether malaria transmission can be interrupted in Ethiopia; and (7) collect baseline data for future evaluation of economic benefits from antimalaria activity in areas where attack operations are planned.

In 1972, an Independent Malaria Review Team (IMRT) made another assessment of the program. The IMRT's terms of reference were to review the actions taken by the MES to implement the recommendations made by the 1970 SRT, and to study the effects of these actions on progress and accomplishment. Also, the IMRT was directed to provide guidelines and comments on both the short and long term courses of action which the MES should take.

The team reported that satisfactory progress had been made in carrying out all recommendations except the integration of the Malaria Service with the Basic Health Services. The team noted there was fear of annexation on both sides, but did not foresee any quick solution to the problem of integrating the two services.

The 1971 Capital Assistance Paper for the Ethiopian MEP included a detailed discussion on its economic impact:

(1) In Area A various sectors, previously vacant, are now extensively farmed and sizeable towns thrive where previously there were none;

(2) Pasture lands have been turned into fixed landcropping;

(3) It was estimated that the area of land under cultivation in Ethiopia increased by 20% between 1965 and 1970. Malaria suppression contributed to about one-half of the increase;

(4) Two large sugar plantations, a cotton plantation, a paper mill, and a meat processing plant have been established in areas where malaria is now controlled.

The Capital Assistance Paper included this very significant conclusion:

"It cannot be demonstrated conclusively that the investment represented by the Malaria Eradication Program realizes an acceptable rate of return....Even if it were possible to precisely measure increases in agricultural output in the areas in which MES operates, there would still remain difficult questions concerning the importance of malaria suppression as an input and the extent to which benefits should be attributed to the malaria investment costs. Nevertheless, fragmentary data suggest that the return to investment in malaria control is quite high, both for specific development project areas and for Area A as a whole."

AID/W has recently approved USAID/Ethiopia's Project Paper for a loan of \$7.2 million to support the ninth and tenth years of the GOE's Malaria Control Program. The major beneficiaries are those people living in the lowland areas where the program is operational. These people--almost six and one-half million--represent a significant percentage (about 24%) of Ethiopia's rural poor. The practical effects of the Malaria Program include not only enhanced health and well-being but also greater human productivity, increased food supplies, and a popular feeling among the people that the GOE is directly concerned about their welfare.

EXHIBIT E

Haiti

Haiti has received about \$19 million in AID grant assistance for anti-malaria programs since 1961. Antimalaria activities are conducted by Service National d'Eradication de la Malaria (SNEM). They also receive assistance from PAHO, UNICEF and the Government of Haiti.

A number of factors complicate the malaria eradication program in Haiti. It is a small, densely populated country, ranking as one of the least developed in the world. Poor sanitary conditions are widespread; rural health services are virtually unknown. Per capita income in the rural area is among the lowest in the world; roads are few and surface transportation is inadequate. Housing is primitive, offering little protection from insects. Destruction of housing by hurricane and other storms is frequent, and exceptionally heavy rainfall perpetuates mosquito breeding sites. Some areas have stubbornly resisted eradication efforts due to geographic problems with drainage and larviciding. Because much of the population is migratory, reinfection of malaria-free areas is a continuing problem. As a result of these and other problems, the transmission of malaria has never been fully interrupted in Haiti.

In December 1974, a Project Agreement was signed between AID and the Haitian Government to provide funding for a new program of communicable disease control, including malaria. The project is designed to transform SNEM into an integral part of the Department of Public Health and Population. SNEM will assist in the control of selected communicable diseases as part of an integrated low-cost health delivery system, and provide assistance to other health-oriented efforts of the Haitian Government.

The antimalaria program has enjoyed only marginal success in Haiti. The original target date of 1968 to eradicate malaria was not achieved; the incidence of malaria has in fact been increasing since 1968. From a low of 2,562 reported cases in 1968, the rate has climbed to almost 26,000 in 1972; 23,000 in 1973, with an increase for the first half of 1974 of 50% over the same period in 1973. Actual rates are probably significantly higher due to inadequate control of testing and diagnosis.

The causes are several. Through the years since 1961, various attack measures have been employed. In January 1962, the first cycle of DDT house spraying was initiated on a total coverage, twice-a-year basis. By mid-1964, continued transmission of malaria was noted, and it became apparent that twice-yearly spraying of houses would not interrupt transmission. Frequent heavy rainstorms washed DDT from the walls; periodic replastering and whitewashing removed the DDT; intermittent hurricanes and other tropical storms damaged and destroyed walls and

roofs; poor scheduling of spray teams delayed spraying at critical transmission seasons. During 1964-65, spraying was increased to four times a year. Although the incidence of malaria was maintained at a low level, transmission of the disease continued. It was finally concluded that DDT spraying alone was insufficient to solve the malaria problem in Haiti, and regular spraying was discontinued from July 1965 to June 1970.

Mass drug administration was initiated in September 1964, and gradually expanded to reach a peak coverage of 1.7 million people during 1966. Participation was reported to be better than 90% in each cycle. Drugs were administered until the population in the individual areas became negative for malaria parasites, and thereafter on a focal attack basis whenever malaria cases appeared. Malaria incidence remained low during the six-year period of mass drug administration but transmission interruption failed to materialize. The cost of the program was substantially higher per person than spraying operations. This was undoubtedly a compelling factor in the decision to discontinue the mass drug program in 1970.

Regular spraying coverage with DDT was reinstated in 1970 with reduced coverage determined on epidemiological data. In 1971 and 1972, an extra spraying cycle was applied in areas with persistent transmission. Nevertheless, malaria outbreaks and reinfection continued in areas of persistent transmission.

The Haiti MEP has been the subject, and frequently the victim, of numerous evaluations over its year of existence. It has been more captive of external influences, since 95% of its budget, and perhaps a higher percentage of its expertise, have been received from external sources. Although most experts have agreed on the basic causes of Haiti's continuing malaria problem, opinions vary as to the remedy, and even to the goal: control or eradication. As a result, program emphasis has shifted from control to eradication and back to control; methodology has shifted from mass spraying to mass drug administration to controlled coverage spraying.

In 1970, a Strategy Review Team of AID, PAHO, PHS, UNICEF, and SNEM representatives reviewed the MEP, and concluded that malaria eradication was technically feasible throughout most areas by use of residual insecticides. There were a few localized areas where additional methods would be required. Among other things, the team recommended routine DDT spraying twice a year of all houses in malarious areas, continuing through 1972. The Government of Haiti was unenthusiastic about implementing the recommendations while the PHS Communicable Disease Center in Atlanta disagreed emphatically with the resumption of total spraying with DDT. They concluded that since malaria was already localized and at a low level, there was insufficient justification for the resumption of total spraying. A consulting expert who had participated in four previous evaluations of the Haiti Malaria Program disagreed with PHS' conclusions and advocated a modified spraying approach along the lines of the review team's recommendations.

At any rate, about 1970 the number of malaria cases and the slide positivity rate began to climb significantly. In 1972, the Haiti program was again subjected to a comprehensive assessment and the team of experts recommended continuation of the program with some modifications. The report was described as "...leaving something to be desired...contains no conclusive evidence that continuation of the program will achieve the project goal." In early 1973, an international evaluation team made yet another assessment of the program and arrived at the now standard conclusion that malaria transmission in Haiti had continued despite all the attack measures employed.

Hindsight reveals a number of factors in organization and planning which have limited and obstructed success of the program:

(1) Confusion of technical responsibility was built into the program from the beginning, resulting in the pursuit of different and often times conflicting philosophies;

(2) Wide variations in year-to-year contributions from assisting agencies caused erratic fluctuations in programming and a lack of consistency in the level of attack;

(3) Lack of continuity in technical personnel assigned by the assisting agencies resulted in loss of program momentum while new personnel became oriented;

(4) Epidemic outbreaks of malaria occurred as a result of hurricanes and tropical storms;

(5) Continuing disagreement among technical experts on the best approach and methodology to be used resulted in radical shifts of program emphasis.

A representative of the Regional Vector-Borne Disease Office in AID/W visited Haiti in August 1974 at the request of the AID Affairs Officer in Haiti. He reported that the well-organized, dedicated group which comprised SNEM ten years ago no longer existed. Now there is no organization, leadership, discipline, or dedication within SNEM. The personnel half-heartedly go through the motions, giving the appearance of compliance with recommendations of successive evaluation teams. The advisor recommended a complete reorganization of SNEM as the only practical means of carrying out the program.

EXHIBIT F

India

The National Malaria Eradication Program (NMEP) in India was the largest single public health program launched anywhere, and the largest investment by AID in any antimalaria program to date.

India's earliest efforts began in 1953 with a five-year National Malaria Control Program, followed in 1958 by a program to eradicate malaria in India by 1965. In 1964, the target date was revised to 1970, and revised again in 1967 to a target date of 1975. Statistics show the 1975 goal was not reached. Instead, India appears to be heading for a widespread malaria epidemic, wiping out the gains made in the early years of the program.

To implement the NMEP, the entire country was divided into 393 units. The original plan projected that all but 25 of the units would be in maintenance phase by the end of 1964-65. The 25 units planned for consolidation phase in 1956-66 were to take care of special problem areas as they were identified, to provide coverage to units started late, and to take care of the international borders. The NMEP was expected to be integrated with the basic public health organization by 1968-69. This goal was not reached. In 1969 there were 113 unit areas in attack phase, 86 unit areas in consolidation phase, and only 194 unit areas in maintenance phase.

An in-depth evaluation of the NMEP was made in late 1970. The team included six representatives from USAID and four representatives from WHO. The team found that in 1970-71 there were 105 units still in the attack phase, 68 in the consolidation phase, and 220 (56%) in the maintenance phase.

The team analyzed 96 units covering a population of about 42 million where persistent attack phase activities were carried out. Records showed that since commencement of the NMEP, 57 spray rounds had been missed, 52 spray rounds were extended, and only 21 spray rounds had been made according to schedule; 66 of the missed or extended spray rounds were due to delays in arrival of DDT.

When the team examined the surveillance operations for the 96 units, it found that only eight were considered to have an effective surveillance operation based on staffing, workload, annual blood examination rate, proportion of missed rounds, supervision, and laboratory performance. The commonest defect was poor performance by the laboratory services. As an example, for 20 units there were 211,702 unexamined slides on September 30, 1970. Also, vector resistance to insecticides was noted in 40 units.

Entomology is an integral part of the malaria eradication program since it contributes important information related to the epidemiology of malaria, and provides supporting data for evaluation of insecticidal attack measures. The review team concluded that the entomological staff of the NMEP did not clearly understand the objectives of their activities. As a result, field entomologists tend to confine their activities to studies of vector density in sprayed dwellings, and insecticide susceptibility tests when and where they found adequate numbers of vector mosquitoes.

The team reviewed insecticides stocks for 14 zones in Madhya Pradesh, a State with about 28 million population. For FY 1970-71, the team found there would be a shortfall of nearly two million pounds, or about 28% of the total quantity required.

Against a minimum requirement of 1,650 vehicles for malaria operation, the team reported that 1,407 operable vehicles were on hand. Many vehicles were old and frequently deadlined due to breakdowns. Out of a total of 2,738 vehicles procured over the life of the program, 550 vehicles were beyond repair; another 775 were deadlined awaiting major repairs. The cause was the NMEP's failure to develop an effective program of preventive maintenance.

Urban malaria had not been dealt with effectively and represented a serious threat to the malaria eradication program. The team estimated that 25% of the detected urban malaria cases were exported to rural areas before proper drug treatment could be carried out. In 1970, there were 310 towns and cities in India with a population of 40,000 or more. In a number of these cities and towns malaria was on the increase.

The team found that over the entire program area, new malaria cases were occurring at an increasing pace since 1963. The teams predicted that the present trend of outbreaks and increasing reversions would result, if uncontrolled, in the eventual failure of the eradication program.

The team also believed that human factors have contributed to the retrogression of the program. These were:

- (1) Disinterest and even contempt on the part of the medical profession towards malaria programs;

- (2) Lack of a special sentinel system for the more dangerous situations;

- (3) Collection of slides beyond a reasonable and manageable limit - creating a backlog of slides that delayed the classification of cases, their radical treatment, the epidemiological investigation and, therefore, the quick elimination of foci;

- (4) Absence of adequate provision for the maintenance phase;
- (5) Ineffective implementation of recommendations of prior program assessments;
- (6) Absence of supporting legislation to provide a legal umbrella to all the malaria eradication requirements;
- (7) Inadequate implementation of the screening process for malaria cases in all official medical services.

The team analyzed the training efforts for the three-year period from 1967 to 1970 and concluded they were inadequate. The lack of a strong headquarters component for training along with the decentralization of training responsibilities to lower echelons resulted in substandard training efforts. A massive reorganization was needed for malaria eradication to succeed.

The review team concluded their report with basic recommendations in four major areas:

(1) Administration

All phases of administration/management related directly or indirectly to the malaria eradication effort must be directed toward enabling the NMEP to function with full effectiveness under a variety of situations.

(2) Epidemiology

Epidemiological services throughout the NMEP must be reoriented, strengthened, and used more effectively.

(3) Operations

The quality of the operational program in attack and consolidation phase areas must be improved markedly. Field supervision of the activities must be intensified at every level, but especially within the unit.

(4) Maintenance of Achieved Eradication

Basic health services for both rural and urban populations must be fully established and functioning in advance of the maintenance phase if the integrity of eradication is to be maintained.

The incidence of malaria is on the increase in India according to a June 1975 airgram from the Embassy in New Delhi. The table below portrays the dramatic increase in malaria cases since 1970:

<u>Year</u>	<u>Malaria Cases</u>
1970	694,647
1971	1,323,118
1972	1,362,806
1973	1,498,461
1974	2,500,000 (best estimate)

WHO predicts that the malaria incidence in 1975-76 will show a substantial increase. Malariologists in AID's Office of Health predict ten million malaria cases within the next two years. The same problems which have plagued other national antimalaria programs are evident in India's program. In addition to lax administration and neglect of surveillance and spraying operations, the program has suffered acutely from a shortage of insecticides and funds. Against requirements of 18,600 metric tons of insecticides for 1975-76, only 13,760 metric tons are available for the program. There is also an acute shortage of antimalarial drugs. The budget for the antimalaria program for 1975-76 is only Rs. 230 million whereas the Health Ministry estimates a minimum requirement of Rs. 650 million for an effective program.

The Government of India is currently reviewing a ministry committee report that has recommended the immediate switch of the program from eradication to control. The committee has recommended the reclassification of the country according to the incidence of malaria, previous malaria status, and resistance to insecticides and drugs. It has recommended a new strategy control in each area on the basis of these classifications. Particular attention is given to urban areas with intensive antilarval measures supported by drug treatment. The committee has also recommended expansion of research programs and strengthening of malaria training at national, regional, and state levels.

The 1976 AID Presentation to Congress states that the resumption of a U.S. Development Assistance Program to India is under consideration. If a mutual agreement is reached, it would appear that one priority program would be assistance to India's NMEP*. Serious malaria resurgence could negate the \$300 million investment by AID in India's NMEP as well as millions in other development programs of which agriculture was one of the biggest. Recurring malaria in India threatens AID's future investments in antimalaria programs in Nepal and Pakistan.

*Now postponed

In spite of all the current problems of the program, it must be recognized that the achievements of this program are unparalleled--the reduction of malaria from 75 million cases a year to 20 million cases a year after five years of a control program, and a further reduction to 100,000 cases a year in 1965 after five years of an eradication program.

EXHIBIT G

Indonesia

The Government of Indonesia (GOI) regards malaria as a major health problem and deterrent to agricultural development. The Indonesian Department of Health estimates that 94% of the population are at risk from malaria. The most recent records (1972) show 128,000 malaria cases in the Central Islands and 155,000 cases in the Outer Islands. In view of inadequate case detection procedures, the actual number for the Central Islands may exceed one million with the number for the Outer Islands over six million.

In 1951, a malaria program was initiated in Indonesia. At that time there were approximately 20 million cases of malaria annually. By 1959 the program was converted to the preparatory phase of a Malaria Eradication Program (MEP). By 1962 all provinces of Java and Bali were included in the MEP program and by 1964 all of Java and Bali had achieved some degree of coverage. Java and Bali became practically malaria-free by 1964 except for the south coast of Java and the north coast of Bali. AID assistance to the Indonesian MEP during this period exceeded \$40 million.

The program was completely disrupted in 1965 by the political and economic turmoil in Indonesia and the concurrent termination of U.S. assistance. Total coverage spraying operations were discontinued due to a shortage of funds and supplies. Lack of funds also prevented adequate maintenance or replacement of vehicles necessary for the effective planning, conducting, and supervising of field operations.

In 1972, the GOI requested renewed AID assistance; and in the same year an AID-financed team recommended that AID once again provide assistance. AID fully shares the concern of the GOI over the growing incidence of malaria in Indonesia and the destructive humanitarian and development implications if this situation continues. In FY 1974 AID agreed to loan Indonesia \$24.8 million to supplement that country's \$46.2 million, five-year joint project for malaria control. Specifically, the project proposes to: (a) reduce transmission of malaria on Java, Bali and Madura (Central Islands) to as low a level as possible through household spraying of DDT; (b) reduce transmission by the same means in priority areas of the Outer Islands; (c) make presumptive and radical treatment available in the Central Islands and suppressive drugs available in the Outer Islands; and (d) conduct research activities.

While U.S. assistance to Indonesia is increasingly directed to improvement of basic health programs, it is also concerned with the need to assist the small farmer to produce and earn more, and to improve his standard of living. The malaria program has immediate humanitarian and development impact. The project will affect the lives of more

than 100 million people and is potentially the program with greatest impact on the largest number of Indonesia's poorer people. Malaria control will not only give support to basic improvement in health standards throughout the country, but by giving relief from the debilitating effects of this disease, permit a growing capability to work, produce, and increase incomes. Upon conclusion of the project, the GOI will be in a position to continue effective malaria control on Java, Bali, and Madura and continue a sustaining control program in the Outer Islands.

EXHIBIT H

Nepal

Malaria has been a concern of the Government of Nepal (GON) for 20 years. Systematic malarionometric surveys were first conducted in 1955-57 by the GON, WHO, and the U.S. Mission. The basic agreement for the MEP between the U.S. Mission and GON was signed on December 4, 1958.

Malaria resurgence in Nepal has increased to the level which threatens the development of a health delivery system on a national scale. The implication of this resurgence assumes tremendous importance in terms of the overall economic situation in Nepal.

The original plan indicated that it would be feasible to eradicate malaria from the country by July 1971. During implementation of the MEP, problem areas appeared where malaria transmission was not being completely interrupted. The program was being hampered by poorly developed communication facilities, lack of qualified administrative and technical personnel, large population movements, replastering of houses, and large populations sleeping out of doors in certain seasons. Hence, the original plan was revised and the program was extended to July 1973.

In 1968, an Independent Assessment Team recommended that 1,747,901 people be passed to the consolidation phase. Annual epidemiological evaluations passed the following population groups from the attack phase to the consolidation phase:

<u>Year</u>	<u>Population</u>
1969	629,609
1970	859,160
1971	307,125
1972	995,039

In a move toward multilateralization, AID started the withdrawal of all technical assistance in FY 1971. It was subsequently decided to fund one man-year to alter the direction of the malaria eradication program to a control program, and to assist the Nepal Malaria Eradication Organization (NMEO) to incorporate other public health functions into the antimalaria activities.

On July 5, 1972, a Project Activity Termination Agreement was signed between the GON and AID. It was agreed that the GON would continue to support the NMEO. At the time of the signing of this agreement, the MEP had covered 5.9 million population of which approximately 80% was in the consolidation phase. The NMEO was considered to be the best organized and operated program in the Nepal Department of Health.

Efforts were being made for an orderly transition from an eradication to a control program.

Pilot projects were started in two districts for the development of an integrated basic health structure. Two dissimilar districts were chosen to test health service integration in malarious areas of the country ready to enter the maintenance phase.

In early 1972, a Strategy Review Team evaluated the MEP and the development of the Integrated Basic Health Services. Their report disclosed that malaria had diminished to a very low level. Malaria incidence in all of Nepal was about 2.44 per 1,000 population compared to areas under the consolidation phase where it was 0.14 per 1,000 population. The team noted several operational and technical problems impeding malaria eradication goals, and submitted 18 recommendations to the GON for consideration.

In 1973, the USAID Regional Malaria Officer made a review of the status of the NMEO program at a time when the malaria service was the only program which regularly reached all the people living in its area of operation. The program was considered to be one of the most popular rural projects in Nepal. His report, made on January 1, 1973, said there were 6,800,550 living in malarious areas, of which 6,200,550 were covered by the NMEO/MEP. Also, a review of malaria trends in a number of districts showed a slow but steady rise in the malaria incidence rate.

The report stated that for FY's 1973 and 1974 the NMEO would be faced with a shortfall of funds resulting in a crisis for the organization's malaria activities. The GON had not recognized that a 100% increase in their contribution would be required to continue the program until the NMEO could be suitably integrated into the health structure. The malaria advisor projected this transition could not take place for six to eight years. He also projected a gradual increase of malaria with serious focal outbreaks if a drastically lowered NMEO program had to be planned.

The 1973 assessment was followed by a more comprehensive program review in early 1974 by a team made up of representatives from the GON, WHO and AID. The review had been requested by the NMEO because malaria rates had been rising; DDT resistance was evident in some areas; and drug resistant parasites had also been reported in some areas.

As a result of the 1974 review, the NMEO converted about 1.3 million people back to the attack phase. Malaria cases continued to rise throughout 1974. Spraying equipment and insecticide were not available in sufficient quantity to cover the reverted area and supplies of drugs ran short. The continued deterioration of the situation prompted the Department of Health to schedule another situation analysis in early 1975 with WHO and AID as participants in the assessment. The team concluded that:

(1) The general administrative capabilities of the NMEO were weakened by the transfer of personnel and abolishment of key NMEO administrative posts;

(2) Increased costs for insecticides and drugs had severely strained the NMEO budget; funds for the procurement of supplies and equipment were not provided on a timely basis;

(3) Personnel training had been inadequate;

(4) There had been a severe shortage of spray pumps, DDT, and anti-malaria drugs and the lack of spray coverage was a major factor in the rise of malaria cases throughout the country;

(5) The transport strength had deteriorated and only 12 out of 33 vehicles were in operation;

(6) The rising malaria incidence in the bordering states of India increased Nepal's vulnerability to malaria;

(7) Vector resistance to insecticides had risen;

(8) The emergence of a resistant strain of parasite in the eastern region of India resulted in a steady flow of such cases to Nepal.

Three basic conclusions were reached by the 1975 review team:

(1) There is a serious threat of malaria to the health and economic welfare of the people of Nepal;

(2) A detailed Plan of Operation which is technically sound, operationally feasible, and fiscally acceptable must be prepared and approved for the NMEO;

(3) The malaria situation can be effectively corrected if proper action is taken.

The team made 23 recommendations related to administrative, operational, and technical activities of the MEP.

In May 1975, a proposal for a five-year malaria control project was submitted to AID/W and subsequently approved. The project, running from July 1975 to July 1980, will assist the GON to improve malaria control services to approximately 6.5 million people living in the malarious areas of Nepal. The NMEC program will carry out a large-scale program of: (1) spraying the interior of rural homes with residual insecticides; (2) continuous surveillance of the population at risk to malaria to detect cases of malaria; (3) treatment of cases detected; (4) participation and coordination in the establishment of an integrated health service; and (5) health education.

The five-year project will cost an estimated \$20.4 million, of which AID will provide about \$4 million. The GON has placed the control of malaria at a high priority in its health planning and has given assurance that this program will continue to receive adequate financial support in its overall health program. The Country Team believes that Nepal has both the financial capability and the human resource capability to effectively utilize the grant funds for the project and to maintain the planned program after withdrawal of USAID assistance.

The USAID project paper provides for annual external evaluations which examine technical, administrative, and operational aspects of the program. There will be a greater emphasis on management performance than in past assessments. The provision of the technical services of an experienced malaria advisor with a sound background in public health is considered an essential ingredient in the USAID project support strategy. This person should have in-depth, overseas experience at a senior level with AID-assisted malaria programs as well as educational and work background in public health in developing areas. The GON agreed on the need for the services of this technician and he has been nominated and recently approved.

EXHIBIT I

Pakistan

Malaria has plagued the Indo-Pakistan subcontinent for centuries, affecting vast segments of the population.

From 1952 through 1957, the U.S. provided about \$1 million to the Government of Pakistan (GOP) in support of malaria control activities. In 1957, further assistance was terminated as a result of the U.S. position that programs related to malaria should have as their objective the eradication of the disease rather than control.

In 1958, the WHO and the GOP began developing a program for the eradication of malaria in Pakistan. In 1960, they approved a 14-year plan for eradicating malaria in East and West Pakistan, initiating the program in 1961. The plan of operations followed the accepted format of a four-phase program--preparatory, attack, consolidation and maintenance. The plan was not only comprehensive but was one of the most economical in operation at that time. During its early years the MEP was very successful and often cited as a model.

Since 1967, however, the malaria incidence rate has been rising at an alarming rate. In 1967 there were 9,554 malaria cases; in 1973 over 600,000. There are fears that malaria may rise to a serious epidemic level, affecting 40% to 50% of the population.

Despite a 15-year malaria eradication program, malaria currently is in the epidemic stage. Estimates of malaria cases in 1974 approach the 10 million mark. If the trend continues, there could be 23 million malaria cases by 1979.

The economic and financial costs of such an epidemic are enormous in terms of lost production and increased health costs. While industrial production would be reduced, the effect on agriculture would be especially pronounced, since much of the malaria occurs during the critical periods of planting and harvesting.

Although design of the basic program was excellent, successful implementation has been hampered by several factors:

(1) The USAID/Pakistan attributed the major cause of malaria resurgence to the decentralization of the federal government. Each of the four provincial governments assumed responsibility for the MEP operations in its respective province. A Central Malaria Eradication Board was maintained only as a coordinating agency. As a result, a strong concerted attack by the MEP could not be mounted because of disagreements between provinces and the central government.

(2) Budget reductions and delays in releasing funds have plagued the MEP from its beginning. The approved cost of the total Pakistan MEP was \$109 million spaced over 14 years. The expenditures were to be split 50-50 between East and West Pakistan. In early 1965, revisions in cost estimates increased the program costs to \$139 million. Following the 1965 hostilities, the GOP appointed an appraisal committee to recommend ways of reducing the cost. Their proposed revision reduced the total costs of the 14-year MEP to \$118 million, a reduction of 15% from the early 1965 upward revision.

WHO and AID objected to this budget cut. After a detailed review, it was agreed that the East Pakistan MEP budget for the balance of the Third Plan (1965-1970) would probably be adequate; however, it was clear that the West Pakistan MEP could not be executed at the revised levels and still have as its objective the eradication of malaria. In subsequent negotiations a satisfactory scope of work was established and a minimum budget developed to support it. Unfortunately, failure of the provincial governments to release funds in accordance with the program schedule created serious problems:

- (a) Operational efficiency was reduced;
- (b) Zones were transferred from attack to consolidation phase prematurely;
- (c) Staff morale was affected by the delay in the payment of salaries, resulting in the loss of highly trained staff members; and
- (d) Unpaid bills made local suppliers reluctant to furnish supplies to the MEP.

(3) Each year the West Pakistan MEP was faced with the problem of late arrival of imported supplies. A basic target date in the program had been the transmission season starting in late May and extending through July. Average lead time for overseas procurement, shipping, and internal distribution of supplies ranged from five to seven months.

Most imported supplies had been financed under AID Program or Commodity Loans, which normally had not been authorized until late June of each year. After authorization, loan negotiations must be completed and the Conditions Precedent met. Placing of orders by November had been virtually impossible to attain. As a result, spraying schedules could not be met and critical spraying cycles were either delayed or eliminated.

(4) When the MEP began in Pakistan in 1960, no attack measures were planned for localities of more than 20,000 inhabitants. No surveillance activities existed in the larger cities, including Karachi. In 1966, malaria surveys were conducted in 62 areas within Karachi. A positive percentage rate of 9.5 was recorded. Between 1967 and May 1968, further malaria surveys showed the positive percentage rate

had remained almost constant. In 1972, all 16 zones that had been in the consolidation phase reported importation of malaria cases from Karachi. Urban malaria is particularly difficult to control by established methods due to the near impossibility of wholesale spraying of houses.

(5) There have been serious personnel losses in the administrative and technical staff of the MEP. They were caused primarily by irregularity of pay and lack of job security. As of the end of 1970, the turnover rate for malaria officers was 56%; for supervisory staff, 40%. The situation in early 1972 had deteriorated still further, with entomologists and epidemiologists virtually nonexistent.

(6) The Plan of Operation calls for the regular Health Services to assume responsibility for the maintenance of eradication once malaria has been eliminated. At this point the Malaria Eradication Board and its organization is demobilized, with the Health Services absorbing personnel from the MEP to assist in the surveillance and treatment program. However, the mobilization of Health Services in Pakistan had not yet been accomplished at the time 23 zones in East and West Pakistan had already been placed in the consolidation phase. The majority of the remaining zones were projected for consolidation in 1970-71. As a result continuation of residual spraying and mobilization of the MEP organization were required.

(7) Vector mosquitoes have already developed resistance to DDT in many parts of the country. Malaria experts predicted the vector will also develop resistance to malathion, especially in areas where it has been used as an agricultural pesticide. Use of alternative insecticides will significantly increase the cost of spraying.

(8) In September 1970, USAID/Pakistan recommended that June 30, 1971 be the terminal date of grant support for technical services to the MEP. The Mission asked AID/W to inform WHO of this decision and requested the rapid takeover by WHO of funding for all commodities and related technical services. The Mission was prepared to fund malaria supplies and necessary technical services under the program loan as a transitional measure.

In February 1971, AID/W notified the Mission that AID's policy for mutualization of technical services was specifically concentrated on advisory services and that WHO was not budgeted to provide large-scale commodity support. Also, UNICEF was not budgeted to undertake new malaria programs in addition to their other commitments. Therefore, AID/W saw no prospects for WHO and UNICEF to provide commodities to

Pakistan. However, current AID policy did not preclude the use of any effective approach to support a malaria program which was justified by country program priorities.

Nevertheless, in late 1971 USAID/Pakistan notified the GOP that the Mission would not be in a position to provide FY 1972 loan financing for the malaria program. The decision was based on the lack of a strategy to deal with the malaria problem, and the extensive USAID commitments to support East Pakistan relief and rehabilitation programs. The 1971 civil war between East and West Pakistan had serious effects on all basic elements of the MEP: organization, administration, staffing, funding, implementation, and operation. Total USAID assistance to malaria programs (excluding former East Pakistan) totaled \$29.5 million as of March 31, 1974.

In FY 1975, AID provided a Malaria Control Loan of \$35 million and a grant of \$25.3 million in U.S.-owned rupees. The program seeks within a five-year period to reduce the incidence of malaria to a level where the disease is a minor factor in Pakistan's overall health situation and controllable by minor public fund outlays. The objective is to lower the incidence to no more than 500 cases per one million population by 1979. Based on the expectation that the population will reach about 80 million by 1979, the number of cases would be about 35,000 to 40,000. The total projected cost of the five-year plan is about \$95.9 million.

In 1973, the GOP developed a revised plan of operation with the assistance of WHO for a five-year extension of the original 14-year program. In 1974, a team of malaria experts reviewed the implications of the strategy with respect to financial and administrative capabilities. The team concluded that the program concept was viable and reasonable and felt that, if properly implemented, the activities described in the revised plan of operation would result in lowering the malaria rates to satisfactory control levels within three years. AID has concluded that the program, as set forth in the malaria Loan Project Paper, is technically sound and the objectives can be reached.

(9) During our examination of files at AID's Office of Health (TA/H), we noted they had gone on record as opposing the assignment of an AID advisor with no experience or training in malaria and very little training in basic Public Health. TA/H fears that the successful implementation of the five-year malaria program may be compromised by the assignment of an inexperienced malarialogist to the Pakistan Mission. In fact, NESA/Tech requested that TA/H train the advisor in malaria so that he could fill the position of Project Manager in Pakistan. It is not clear why NESA/Tech insisted the assignment be made over the strong objections of TA/H; and why TA/H was apparently not consulted prior to the decision on this assignment.

The Capital Assistance Paper for the loan details AID's monitoring and evaluation plan. This plan commits the USAID to have a professional public health advisor who is highly qualified in malariology and who will be charged primarily with program monitoring and evaluation.

EXHIBIT J

Thailand

Antimalaria assistance to Thailand was first provided by WHO and UNICEF as early as 1949. In 1965, with AID assistance, Thailand began a malaria eradication program. The developing control and eradication efforts were accompanied by a decline of the malaria incidence from 3.5 million in 1950 to about 126,000 in 1970.

Beginning in 1967, malaria indices began to show a progressive increase due to a number of technical, socio-economic, and administrative factors; and by the withdrawal of USAID assistance to malaria programs. With the phase-out of U.S. assistance to the malaria project, about 35% of the 5,076 employees previously paid out of counterpart funds left the project. Continuous reduction of the MEP budget caused reductions in field personnel, delays in operation, and a reduction in the supervision from higher echelons due to shortages of transportation and fuel.

Malaria rates in Thailand in the past five years have increased 300% overall and 600% in the areas formerly freed of malaria. The potential exists at the present time for malaria to return to its pre-program, hyperendemic level in many parts of the country, with periodic serious epidemic outbreaks.

The seriously deteriorating antimalaria program caused the Thai Government to request WHO and AID assistance to review the situation and to make recommendations on which the project could be reprogrammed.

The assessment team concluded that, in addition to the usual budget and administrative problems, new problems were now seriously obstructing the malaria program:

- (1) Resistance of mosquitoes to control by DDT spraying in the forest fringes, deep forest, and cleared hilly areas;
- (2) Breeding of mosquitoes in water pits created when gems are mined from the ground;
- (3) Resistance of malaria to chloroquine;
- (4) Population susceptibility due to migration;
- (5) Occupational risk of rubber tappers who commence their operations in the early hours of the morning; and
- (6) Occupational risk of gem and tin miners in forest fringe areas whose temporary shelters cannot be effectively sprayed.

The team concluded that the program had not enjoyed the level of support necessary to ensure its successful prosecution. They considered the prospects of maintaining good control of malaria were excellent; that the future level of activity should be aimed at protecting the achievements that have been made and moving towards providing a practical multipurpose health service at the field level. Also, the long-range objective should be the eradication of malaria.

At the time assistance to the Thailand MEP was terminated on June 30, 1971, AID's total investment in the project was \$18.5 million. Withdrawal of this support had significant effects on the future of the antimalaria program, and certain planned agriculture and rural education projects could be threatened by malaria outbreaks. The FY 1975 "Submission to the Congress" stated that Thailand must increase its agricultural production for domestic consumption by over 40% during the next ten years. Rural employment at the present rate of growth of agriculture production cannot absorb the bulk of the 600,000 persons expected to enter the work force annually during the 1970's. The AID funds requested for FY 1975 will provide assistance to the Thai Government in agricultural extension and farm credit. Support will be provided to Thai efforts in planning for agribusiness activities having an impact on rural incomes and employment. The resurgence of malaria poses a serious threat to success of these programs.

LIST OF RECOMMENDATIONS

RECOMMENDATION NO. 1

The AA/TA should consider assembling a task force of malaria experts to: (a) review the scope and seriousness of the world-wide malaria problem; (b) determine the adequacy of planning by affected countries for a malaria program within the context of a national health plan; (c) determine the adequacy of affected countries to mount a national health planning process in order to fully consider malaria in the context of all national priorities; and (d) make recommendations to the United States and other involved governments, addressing the most feasible approach to combat malaria.

RECOMMENDATION NO. 2

The AA/TA, in coordination with the USPHS, WHO, UNICEF, and PAHO, should consider establishing and administering a revolving loan fund for antimalaria programs, and soliciting contributions from other involved nations and/or organizations (e.g., United Nations Development Program).

RECOMMENDATION NO. 3

The AA/TA, in coordination with other agencies as deemed appropriate, should consider the feasibility of establishing an international training center for the training of professionals to manage antimalaria programs.

LIST OF REPORT RECIPIENTS

Bureau for Technical Assistance:	
Assistant Administrator (AA/TA)	5
Office of Health (TA/H)	1
Bureau for Program and Management Services:	
Office of International Training (SER/IT)	1
Bureau for Latin America:	
Office of Development Resources (LA/DR)	1
Brazil (ARA-LA/BR)	1
Central America (ARA-LA/CEN)	1
Caribbean Countries (ARA-LA/CAR)	1
Bureau for Africa:	
Office of Eastern and Southern Africa Affairs (AFR/ESA)	1
Bureau for Asia:	
Office of South Asian Affairs (ASIA/SA)	3
Office of East Asian Affairs (ASIA/EA)	3
Office of Technical Resources (ASIA/TR)	1
AAG/W	5
AG/IIS	1
AG/OAS	1
Inspector General of Foreign Assistance (IGA)	1
AG/OC/PE	1
AG/OC/PP	1
U.S. General Accounting Office (GAO), Washington	1