ARTICLES

THE PRESENT ROLE OF THE AGENCY FOR INTERNATIONAL DEVELOPMENT IN WORLD-WIDE MALARIA PROGRAMS[1]

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INTRODUCTION

The Agency for International Development (A.I.D.) of the U.S. Government is actively involved in malaria control activities in Africa, Asia and Latin America. This involvement ranges from support of operational research and training to the provision of commodities and technical services. Support of the local costs of malaria control is not normally a part of A.I.D.-supported malaria control projects, but contributions sometimes are made from Public Law 480 funds for some local cost support in on-going Host Government research efforts to assist in development of new technologies. In addition, A.I.D. provides considerable funding support for research on malaria.

A Region by Region summary of overseas programs assisted by A.I.D. is presented to provide details on individual programs and to illustrate the broad range of countries and activities in which A.I.D. is involved in support of malaria control.

AFRICA

The principal malaria control assistance efforts by A.I.D. in Africa are related to projects in Primary Health Care (PHC). At the end of 1982, A.I.D. was providing assistance to approximately 22 PHC projects in 15 countries in the A.I.D. Africa Region. Most of these projects lie in endemic malaria areas where only rudimentary health delivery systems exist, so control of malaria is included as an activity of these PHC projects. The major malaria control intervention used in these PHC projects is the provision of anti-malaria drugs primarily for chemotherapy which provides individual clinical relief, but does not greatly affect transmission. Manpower and resources are in short supply, and vector control is not normally included in PHC projects. The number of malaria cases in Africa is not known; it is conservatively estimated that there are upwards of 100 million cases per year with 1.0 million deaths.

In June 1982, A.I.D. sponsored a workshop on "Malaria Control in Primary Health Care" which was held in Washington, DC to organize planning and project implementation guidelines for African situations corresponding to the World Health Organization's (WHO) four tactical variants in malaria control. The guidelines prepared by this workshop (Farwell 1983) have been sent to A.I.D. offices overseas to provide guidance in strengthening the malaria control components of present and future PHC projects.

The A.I.D. has had only one specific malaria control project in Africa during recent years. This project is located on the islands of Zanzibar and Pemba in Tanzania. A six-year, $11.7 million loan-assisted project is in progress providing malaria control services to approximately 500,000 people living in this area. This project provides: (1) technical assistance in the form of long-term contract project scientist and a number of short-term consultants, (2) commodities consisting primarily of insecticides, vehicles, laboratory supplies and anti-malaria drugs, (3) support of operational research, and (4) provision of long and short term training. The project is now focussed on baseline surveys, training and creating workable management systems for field operations and administrative responsibilities. To date, baseline parasitological and entomological surveys have been completed. Training has been initiated for the staff especially in entomology and operational management.

Suitable regional malaria control training facilities for Africa are very limited. The malaria training centers established by WHO in Lome and Lagos are no longer carrying out specific long term training in malaria control. The A.I.D. attaches high priority to training of malaria and public health workers in the use of basic and alternative methods of malaria control. Efforts are made to increase attention to

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such training at the national and at the regional levels.

In Africa, operational research on malaria control is limited primarily to the role of anti-malaria drugs, especially chloroquine, plus some studies on the *Anopheles gambiae* complex. Applied field research is promoted by A.I.D., but the limitations of staff and resources are great. There are almost unlimited possibilities for the use of such technologies which would be of tremendous assistance in controlling this disease, which has such an important social and economic impact throughout Africa.

The Africa Bureau plans to give malaria discussions an important place in its forthcoming meeting of the Agency's Health, Population and Nutrition officers stationed in Africa scheduled for June 1984.

ASIA

A.I.D. provides major assistance to country malaria control efforts in the Asian area. Assistance has been provided to Pakistan, Nepal, Thailand, Sri Lanka, India and Indonesia during recent years. Burma has a malaria control component in its A.I.D. PHC project which supports procurement and distribution of anti-malaria drugs. A Malaria Training Secretariat located in Malaysia is being assisted by A.I.D. in cooperation with WHO to provide training support to national training centers and specialize training services in Asia. Specific details on the various countries assisted by A.I.D. are given below:

PAKISTAN. A five year, $41.0 million grant project was approved in mid-1982 for malaria control support to the Government of Pakistan. The A.I.D. project provides for technical assistance, commodity support, establishment of a new Training and Research Center, and operational research support. Malaria in Pakistan in 1983 is reported to be below 50,000 cases. The principal purposes of the U.S. assistance are: (1) to allow for orderly integration of malaria control responsibilities to the general health service organization, and (2) to increase urban malaria control activities. Malathion resistance or tolerance has not yet become a problem in the operational sense although there are indications of increasing tolerances to this insecticide in *Anopheles stephensi* Liston in some parts of the Punjab Province. Chloroquine resistance has recently been identified and confirmed in Pakistan and can be expected to increase in the future. Special malaria problems relate to increased waterlogging conditions in some areas, and to the presence of approximately 3.0 million refugees from Afghanistan within the country. Special malaria control procedures in the Afghan refugee camps which include local spraying and drug treatment have minimized this major malaria threat. U.S. assistance to malaria control in Pakistan is programmed up to 1986. In addition, A.I.D. supports malaria research efforts at the International Center for Medical Research and Training (ICMRT) located in Lahore. This institution is engaged in malaria research in respect to vector mosquitoes and parasite resistance.

NEPAL. Malaria control supported by the U.S. in Nepal is implemented through the A.I.D. Integrated Rural Health and Family Planning Project. Approximately $4.8 million is provided for assistance over the five year period of 1980–85. The funds support procurement of required commodities, training, research support and limited technical assistance within the over-all project. Field monitoring of U.S.-supplied malathion is done through a locally hired malaria officer. A.I.D. assistance is coordinated with that of the World Health Organization (WHO), The British Government and the United Nations Development Program, all of which provide technical assistance and additional support for training, research and commodity procurement.

In 1983, malaria prevalence in Nepal was reported at approximately 16,719 cases (WHO, unpublished documents and data). Approximately 70% of the 1983 cases came from nine districts along the Indian border. The terai malaria vector, *Anopheles annularis* Van der Wulp, is resistant to DDT, but is reported to be susceptible to malathion. Large scale malathion spray operations were carried out in 1981 and 1982 along the terai, with only limited success in reducing transmission and lowering case rates. There have been no chloroquine-resistant parasites reported from indigenous cases, although such parasites have been found in patients with a history of travel to various parts of India. Yearly program evaluations have been carried out by the Government of Nepal and external malaria consultants provided by the assisting donor agencies.

Six of the 42 districts which are in the malarious areas of Nepal have integrated malaria control activities into their general public health programs, and five more districts are scheduled to do so during 1983–84.

THAILAND. The malaria control program in Thailand has increasing difficulties due to wide-spread chloroquine and Fansidar[4] resistance, increasing DDT resistance in the major vectors, and changes in behavior patterns of the major mosquito vectors. For three years, A.I.D.

[4] Trade name for sulfadoxine/pyrimethamine formulation.

assistance had dealt primarily with malaria control training for both malaria and public health workers, limited operational research; and commodity support, construction of research facilities in Bangkok and Chiang Mai, and additional training buildings at the National Training Center. This A.I.D. project will be completed in September 1984. In 1983, 253,905 cases of malaria were reported in Thailand which is believed to include only a portion of the actual cases in the country (WHO, unpublished documents and data). Widespread availability and misuse of anti-malaria drugs has led to a very serious and explosive situation, especially in S.E. Thailand. The westward spread of chloroquine-resistant malaria into Burma and India is to some extent due to the lack of a strong malaria control campaign in Thailand. Operational research on drug schedules, and increased efficiency of spray operations is being strengthened by A.I.D. project assistance.

SRI LANKA. From 1978 through 1983, A.I.D. provided approximately $16.0 million for malaria control support to the Government of Sri Lanka (GSL). This funding has provided training, commodities, technical assistance and support for research facilities. The impact of U.S. assistance has resulted in a dramatic lowering of malaria from well over a half million cases in 1977 to 127,264 in 1983. The program uses only malathion in its residual spray operation because the major vector, *Anopheles culicifacies* Giles, is resistant to DDT. No chloroquine-resistant parasites have yet been reported in detected cases, but such resistance can be expected to appear within a few years. Yearly evaluations of the program have been carried out by the GSL with external malaria consultants provided by assisting agencies. During 1983, a resurgence of the disease has resulted from a reduced focus on field programs, but efforts are being made to correct this situation through increased technical assistance and training.

A.I.D. efforts are coordinated with those of WHO, the British Government and the Government of the Netherlands offices of development assistance. The WHO provides two full-time technicians, plus limited training and research support. The British Government has provided approximately $2.0 million in assistance to GSL anti-malaria activities, mainly in vehicles and transport. The Netherland's contribution of $4.0 million has been primarily for insecticides and warehouse construction. This program is an activity where excellent multi-donor coordination is managed by the GSL to accomplish its objectives.

INDIA. Recent A.I.D. assistance to India for malaria control was completed in 1982. The $38.0 million provided by A.I.D. has been expended primarily for malathion, temephos, DDT and ultra low volume (ULV) spray equipment. The project originally was planned for a four year period (1979–82) to provide external assistance to the Government of India (GOI) in meeting its insecticide requirements for malaria control until national production capacity could meet those needs. By the end of the second year of the project, the GOI informed A.I.D. that its national production capacity was sufficient to meet its expected malathion requirements, and only a short-fall in DDT availability was foreseen. A.I.D. has performed a series of Project Evaluation Summaries, based on National Malaria Evaluation Program's records and field observations, primarily in the states of Gujarat and Maharashtra. Special attention was given by A.I.D. to training in the application of organophosphorus insecticides and in effective health safeguards for field operation personnel. In 1983, India reported 1,157,385 malaria cases in the country. This represents a major improvement over the 2,753,217 cases recorded for 1980. Major problem areas for malaria are found in Uttar Pradesh, northeastern portions of the country, Orissa and Gujarat.

INDONESIA. For three years A.I.D. has provided assistance to a malaria control project on the island of Timor, plus some consultant services on Java for vector control in focal malaria problem areas. The Timor Malaria Project is directed at a serious disease problem, but working conditions (lack of security) in the area do not allow full utilization of the available assistance. One long-term contract advisor was assigned to the project, and commodities were provided. When the contract project advisor assignment was completed, the advisor returned to the U.S.A. The Outer Islands of Indonesia have a number of urgent malaria problem areas which affect orderly development and human well-being. The World Bank is considering some limited malaria control assistance in Suluwesi over the next several years. Malaria case records are valid only for the Java-Bali islands of the country where 84,266 cases were recorded for 1983. The Outer Islands reporting systems are not complete, but reported 135,503 cases for 1983. It is estimated that the Outer Island case report is less than 20% of the total which actually occurs. The WHO provides technical assistance and training/research support to the Indonesian malaria effort, coordinated with A.I.D. activities.

MALAYSIA. When WHO, AID, and the Centers for Disease Control (CDC) of the U.S. Public Health Service realized that malaria eradica-

tion was not an immediately achievable goal particularly in hyperendemic areas of the world, a re-orientation of national and international efforts against the disease was recommended and malaria control efforts, based on epidemiology variables were clearly mandated. This policy/strategy shift from malaria eradication to control involved the establishment of attainable goals, the effective employment of available resources, and the application of a combination of anti-malaria measures appropriate to the problem in any given area.

In 1978, an assessment of the malaria situation in Asia by an international team of experts concluded that an extensive reorientation of malaria programs in the region was required and that training at all levels of personnel would be the most appropriate means in realizing this goal. The experts realized that malaria control is a much more complicated and complex issue than malaria eradication. The paucity of trained personnel in any malaria control program, even when well designed, was recognized in many countries of Asia as a fundamental problem hindering success.

The Agency realized that the most productive approach in addressing these needs was through the development of a training program directed toward this most pressing problem. Therefore, AID in 1982 in collaboration with the CDC, and the WHO, appropriated special funding for the establishment of a Malaria Training Secretariat at Kuala Lumpur, Malaysia. This International Secretariat for Malaria Training was developed to address individual country needs in the region and to impact malaria program effectiveness through seminar/workshops at various levels of program organizations. To date, this institution has held a course for National Training Center Directors of the Asian area and made a number of training need surveys.

LATIN AMERICA

Malaria control is a component in several A.I.D. supported PHC projects in Latin America, but there is only one major A.I.D. project specifically aimed at malaria control in this area. This project is located in Haiti. It is estimated that there are approximately 200,000 cases of malaria in Haiti each year, although only 50,000 cases were reported for 1981. U.S.A. foreign aid has assisted this program for nearly 30 years. In mid-1982 A.I.D. approved a new five-year, $8.5 million malaria control project for 1982–86 to assist Haiti in its anti-malaria program. The A.I.D. project provides for technical assistance, commodity support, operational research and training, and 35% of the field operations costs. Attention is directed specifically at providing proper epidemiological studies, and operational stratification of the program. Fenitrothion is being used in spray operations to control the principal vector, *Anopheles albimanus* Wied. The fenitrothion is provided to the Haiti program free of charge by the Government of Japan. Health safeguards for spray personnel are implemented through training and the provision of protective equipment. WHO/PAHO has a team of three malaria advisors assigned to Haiti, and also supports training and research efforts in the program.

The dominant malaria species in Haiti, *Plasmodium falciparum,* is treated successfully with chloroquine, primarily through volunteer collaborators and health institutions. The presence of chloroquine-resistance is being carefully monitored.

A.I.D. does support limited malaria control efforts in Honduras and has been instrumental in developing an epidemiological approach to the malaria problem.

There are no direct hire A.I.D. personnel trained in malaria control with operational experience in field positions or in the Washington offices of the Latin American Bureau. There is one U.S. contract malaria advisor in Haiti with extensive field experience funded by A.I.D.

There has been a 50% increase in malaria cases during the past five years in Latin America; wide-spread insecticide resistance to a number of compounds occurs in Central America, and there are serious needs for training and research support. The presence of malaria in Latin America has serious health implications for the U.S. due to the large amount of inter-America travel. The importance of malaria in Central America was highlighted in the recent "Report of The Bipartisan Commission on Central America" which recommended that the U.S. resume assistance for malaria control in this area (Kissenger 1984). PAHO is assisting a number of countries in Latin America and in 1981 provided 24 professional and technical staff to field programs. In 1973, PAHO had 65 such staff assigned to Latin American country programs.

AID/WASHINGTON

OFFICE OF HEALTH, BUREAU FOR SCIENCE AND TECHNOLOGY (S&T/H). Technical assistance for malaria control and other vector-borne diseases is provided to the various regional bureaus of A.I.D. by the S&T/H Bureau, which has three scientists available in its Communicable Disease Unit along with several officers assigned to primary health care projects. During 1983, the

A.I.D. provided direct overseas consultant assistance to country malaria control field projects in Haiti, Tanzania, India, Sri Lanka and Nepal, and assisted in obtaining the services of short-term consultants for specific country requests in the fields of entomology, research, malariology, management and operations.

In addition to field services, technical information/advice is provided to various country and regional bureaus through attendance at meetings, conferences, project reviews, field inquiries and by preparation of project documentation. Unfortunately, A.I.D.-supported projects on field trials of new insecticides was terminated in 1983 and there is a need to resume this support.

There are major A.I.D. inputs into support of malaria immunity and vaccination research, with a research linkage system now consisting of 14 projects located in a number of U.S. universities and research centers. A.I.D. has supported research on immunity since 1966, beginning with a single contract. Although the development of a viable malaria vaccine will not constitute a single solution to the entire complex malaria problem, such a vaccine would add to the arsenal of weapons which can be employed against the disease, to complement the use of chemotherapy, vector control, and other interventions. Two new technologies—hybridoma technology and genetic engineering—now provide helpful tools in the development of a vaccine. The A.I.D. program now budgets approximately $8.0 million each year for research support for the development of malaria vaccines, and is linked with the efforts of the WHO malaria immunology program.

Additional funds are channeled directly or indirectly through various institutions to support research projects in the U.S., and in countries abroad, on various other aspects of malaria research, such as anti-malaria drugs, entomological aspects, and operational vector control. Such support may come directly through central funding such as the Office of the Science Advisor, project funding at the country-level or indirectly by funds provided through the National Academy of Science.

CONCLUSION

A.I.D. continues to provide substantial assistance to numerous countries in support of national efforts to control malaria. Such support is justified on the basis of the economic and social importance of this disease to developing countries. In recent years there has been a decided shift in program emphasis to support more research activity, and to give increased attention to the role of PHC in malaria control. The major portion of A.I.D. support for field projects in malaria control is provided to the Asian area, but with increasing attention being given to the needs of Africa and hopefully to Latin America, there may be more support to efforts in these regions in the future.

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