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9. ABSTRACT

A PROJECT: To assist with the evaluation and redesign of the malaria control program in Pakistan.  
 DURATION: 1961-1977  
 DEVELOPMENTS: This report describes the background of the program, the monies used, problems encountered, short term measures, long term measures, staffing, technical assistance, integration, and recommendations and conclusions. The Malaria Control Program began in 1961 and originally aimed at total eradication of malaria in Pakistan by 1975. There was outstanding success from 1961-1967 but a resurgence became evident in 1969. The resurgence was due to increasing resistance by the vectors to DDT, unchecked urban malaria infiltrating back into malaria free areas, lack of organization in the permanent health services, and reduction in the malaria eradication program budget and manpower. By 1973, ten million people were infected with malaria, a condition worse than 1961 when the program began. The 1973 epidemic caused the Government of Pakistan to revise the original 1961 plan. A.I.D. assistance was requested in financing the substantial foreign exchange and local support costs of the program. The short term measures for malaria control include larviciding, adulticiding, minor engineering works for source reduction, case detection and treatment, and biological control of the vectors. The ultimate solution of the malaria problem is the elimination of the conditions which are conducive to the generation of vector breeding areas.

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Since 1976 the Pakistan Malaria Control Program has sprayed over eight million houses annually and protected an estimated forty-seven million people from malaria.

AID/ASIA-C-1237 GTS

Shurkin

GTS

PN-AAE-788

Contract No. AID/ASIA-C-1237 GTS

Dated: April 25, 1977

MALARIA CONTROL PROJECT

Final Report

on

Evaluation and Redesign of the Project

by

Walter S. Shurkin  
Malariologist  
US AID/Islamabad

October 16, 1977

A. Purpose of Assignment

To assist the Mission with the evaluation and redesign of the malaria control program.

B. Statement of Duties

1. Assist the US AID with preparation of documentation required for second tranche of dollars 7.5 million of malaria loan funds which is scheduled for FY 1977.

2. Review and evaluate Government proposals for redirection of the program including alternate methods of malaria control, source reduction, mass radical treatment of fever cases in selected areas, and the addition of communicable disease control duties to the responsibilities of malaria workers in selected areas.

3. Assist the US AID in preparing program documentation needed to carry out any agreed upon amendments to the malaria loan.

4. Assist the Government in coordinating planning and start up activities in urban malaria control by Federal, Provincial and Local Governments to be procured in support of calendar year 1978 urban malaria control field activities.

5. All other duties as directed by the Mission.

C. Reports

1. The consultant will make oral reports to US AID on the progress of work during the course of the assignment. At the end of the period of assignment prior to departure from Pakistan, a written report of activities, accomplishments and recommendations, including further assistance needed for project development, shall be furnished to the US AID. Additional copies will be furnished to: (a) Two copies to the AID Reference Library, AID, Washington, D.C. 20523; (b) One copy to AID/ASIA/PD.

Introduction and Background

The Malaria Control Program is part of an on going effort started in 1961 and redesigned in 1974. The program was originally aimed at the total eradication of malaria in Pakistan by 1975. From 1961-67 the program was an outstanding success, reducing total malaria cases

in rural areas from an estimated 7,000,000 to 9,500 cases in 1967.

Resurgence of malaria became evident, particularly in the Punjab and Sind provinces by 1969. This resurgence was caused mainly by four factors: (1) Increasing resistance by the vectors to DDT (2) Unchecked urban malaria infiltrating back into malaria free areas (3) Lack of an organization in the permanent health services responsible for maintenance of malaria in areas freed of malaria (4) Severe reduction in the Malaria Eradication Program budget and manpower.

This situation deteriorated to such an extent that by 1973 it was estimated that Malaria had infected ten million people in Pakistan. Conditions were reported to be worse than in 1961 when the Malaria Eradication Program began. The slide positivity rate rose to 26.3%. Even more alarming was the increase in the rate of the virulent form of plasmodium falciparum infections in relation to total malaria cases. Although no reliable statistics were available, it was estimated that thousands of Pakistanis died of malaria in 1974. The resurgence of plasmodium falciparum was of particular importance and concern because chloroquine resistance had been reported as near as Bangladesh.

In 1973 partly as a result of devastating floods in that year, Pakistan experienced a major epidemic of malaria in the Punjab and Sind provinces. The GOP became greatly concerned and in the summer and fall of 1973 held a series of meetings with the provincial officials to draw up a strategy and revise the 1961 original "Plan of Operation". These meetings, with the cooperation of WHO, GOP and provincial health officials, resulted in a five year extension, hereafter referred to as the Revised Plan of Operation (RPO) of the original fourteen year program. Because eradication was deemed to be impossible with resources available the program was renamed the Pakistan Malaria Control Program. The ultimate goal is to eradicate malaria in Pakistan when the economic and sanitary conditions, improved and sufficient resources are available.

The GOP requested US AID assistance in financing the substantial foreign exchange and local support costs of the program. After findings by a team of experts that the RPO would result in lowering the malaria rates to satisfactory control levels within three years, the US AID, in March 1975, approved a \$35 million loan to finance 60% of the foreign exchange costs of the first three years of

Pakistan's Malaria Control Program. It was understood that AID would authorize the maximum amount from FY 1975 funds (Not to exceed \$35 million) and then amend the authorization to provide the balance when additional funds become available. Accordingly, a loan of \$20 million was authorized on June 30, 1975. In addition, a grant of U.S. owned Rupees equivalent to \$25.3 million was approved.

The loan has been disbursed on a reimbursement basis. Foreign exchange amounts required for each year's purchase of imported insecticides have been committed and expended by the GOP: AID reimbursed the GOP for AID's appropriate share following the borrower's satisfaction of annual conditions precedent.

To date, AID has reimbursed \$7.8 million for foreign exchange costs incurred for the 1976 spraying season, and plans to authorize an additional \$8.0 million for reimbursement of 1977 spray season foreign exchange costs as soon as 1977 Conditions Precedent have been met. Thus a balance of \$4.2 million in foreign exchange remains of the \$20 million authorization. It is estimated that the GOP will require \$13.4 million in foreign exchange to finance 1978 operations under the malaria control program. In addition to the \$4.2 million available, approximately \$3.8 million will be required to fulfill AID's commitment to finance 60% of the foreign exchange costs of the first three years of the program. Therefore, the Mission recommended that the authorization be amended to provide an additional \$4.0 million.

Because of the delay in implementing the RPO in CY 1975 and CY 1976, and the decrease in actual costs of malathion, funds allocated for those years were not completely spent. The spraying period had to be extended two years if the target of control of malaria to an incidence of 500 cases per million population was to be met. In January 1977, the External Assessment Team recommended "that the GOP/US AID extend the period during which disbursements are made under the AID Loan 391-H-163 from three to five years i. e., from 1975/76 through 1979/80."

The Mission also recommended that an allotment of Rs. 120 million be made to the Mission, to be granted to the GOP, as reimbursement for local costs incurred in CYs 1977 and 1978. This would be part of the Rs. 250 million US \$25.3 million approved in March 1975.

The above section has been taken from the "Recommendation for Amendment of Loan Authorization" of August 25, 1977 which the consultant helped to prepare.

The consultant during the contract period:

1. Prepared the monthly and interim safety reports.
2. Prepared memorandums of conversation of conference attended regarding malaria.
3. Prepared field trip reports regarding findings of safe spray operations. Effectiveness of spray operations and problems encountered.
4. Helped in the preparation of the "Recommendation for Amendment of Loan Authorization."
5. Gave support to Dr. Miller's efforts in his endeavours setting up five laboratories for blood cholinesterase testing.
6. Prepared forms for use in spray safety monitoring and gave direction and guidance to AID personnel used to monitor the spray operations for conforming to recommenced safe spray procedures.
7. Kept the Mission informed on all aspects of the Pakistan Malaria Control operations.
8. Kept a constant contact with the DOMC and other malaria control officials.
9. Made recommendations to the DOMC and US AID on safe disposal of empty malathion cartons and unused Italian malathion.
10. Made frequent field trips to: (a) Monitor spray operations for safety and effectiveness (b) Uncover latent or potential problems which might affect the effectiveness of the Malaria Control Program. (c) Gathered epidemiological and entomological data in order to assess the effectiveness of the spray operations.

11. Reviewed COP documentation (plans of Action, Control of Urban Malaria, Proposed Malaria Research Center, and other documents relating to the Malaria Control Project), to determine whether these plans and documents would conform to the requirements of the Malaria Loan Agreement.
12. Attended the Provincial Coordination Committee meeting in Quetta, August 9-11 for the purpose of discussing 1977 progress made of all aspects of the MPC, and determining resources needed for the CY 1978.

#### Problems Encountered

##### 1. Delayed Spray Operations:

Because of a series of events the 1977 spray operations was delayed in all provinces except for Baluchistan. The Sind province had the greatest delay. These delays were unfortunate as timing is of the essence if the spray is to be applied prior to the transmission season. Reasons for the delays are as follows:

- (a) Late purchasing of insecticides because of changes of malathion specifications.
- (b) Political disturbances which delayed off loading of insecticides and equipment for end use distribution.
- (c) Lack of rail cars to ship insecticides and equipment and slow GOP approval to use trucks for distribution.
- (d) Meeting of all safe spray recommendations prior to spraying. Protective clothing was not available for several weeks after planned spray operations were to start.
- (e) Arrival of BHC on August 30, 1977 which precluded spraying in areas of the Sind province where BHC was scheduled to be used.
- (f) WHO's and CDC's slow analysis of existing cyanamid malathion. Samples were taken in March and April but the results of the analyses were not available until the end of June. At that time, permission to use 1976 cyanamid malathion was granted.

All these delays were beyond control of the Malaria Control Program, but the time spent in the purchasing of insecticides and equipment could have been shortened if the DOMC had sufficient staff to carry out this assignment.

## 2. Urban Malaria

The plan for Urban Malaria Control was not approved until the end of July, a year and a half after it had been written. Heavy rains in Karachi had precipitated an epidemic of malaria. Municipal resources were not able to cope with the situation. The WHO Sanitary Engineering Advisor, Mr. Tuazon was transferred to Islamabad to support the monitoring of safe spray procedures and was no longer available to advise the City of Karachi on engineering methods of malaria control.

The Special Covenants and Warranties Section, 4(a) of the Malaria Control Loan 391-H-163 states "The Borrower shall carry out the Malaria Control Program with sufficient man-power and funding so that both urban and rural malaria will be effectively controlled in Pakistan."

To accomplish this aim, an Urban Malaria Control plan was developed by the DOMC in collaboration with the Provincial Malaria Control officials and interested municipal agencies and approved in July 1977 by the GOP. This plan provides a budget to purchase equipment, supplies, larvacides and insecticides to be supplied by the GOP to the ninety-five municipalities over 25,000 population. The Provincial Malaria Control Official would supply technical guidance and would coordinate urban malaria control operations at the provincial level. Responsibility for the execution and funding of operational costs will, as in the past, rest with the municipal bodies concerned.

The DOMC is in the process of ordering equipment, supplies, insecticides and larvacides for distribution early in 1978. As of now, the provinces have not nominated or designated personnel who are to give the technical guidance and coordination to the municipal agencies involved. As of now, very little if any coordination has been established between the provincial officials and small municipalities. A singular exception is the staffing of 23 activated passive case detection posts in Karachi hospitals and clinics by the Karachi Malaria Control District. These posts are averaging 3,000 blood slides per month. Bloods are taken from fever cases

referred by clinicians on duty. Cooperation between hospitals and clinics and the malaria control program personnel assigned to take blood slides is excellent. The number of blood slides taken at the activated passive case detection posts now exceeds that taken in normal active case detection operations by the Karachi Malaria Control District.

All persons sampled are given chemotherapy as prescribed by the clinicians. Large hospitals having Laboratory facilities to immediately stain and examine the blood slides for malaria parasites. A concerted effort is made to treat radically plasmodium falciparum cases found. This has not been successful at the present time.

The plan for malaria control is based on long and short term control measures.

A. Short Term Measures

1. Larviciding
2. Adulticiding
3. Minor engineering works for source reduction
4. Case detection and treatment
5. Biological control of the vectors

E. Long Term Measures

Ultimate solution of the malaria problem by the elimination of the sanitary conditions which perpetuate and are conducive to the generation of vector breeding areas.

DOMC Staffing

The DOMC does not have sufficient staff to carry out its responsibilities of direction and guidance to the Provinces in their efforts to control malaria. The already overburdened staff were assigned new responsibilities over those which they already were unable to carry out. Spray operations monitoring by the DOMC staff was sporadic and infrequent. Information regarding epidemiology, and operational progress was scanty and late.

The DCMC has four professions trying to cope with the responsibilities of advising and directing the Provincial Malaria Control activities, purchasing and distributing of \$13,000,000 worth of equipment and insecticides, purchasing and distributing equipment and insecticides purchased with local currency, preparation of quarterly and annual reports, preparation of documents for the GCF and AID, preparation of budgets, scheduling and directing periodic meetings of provincial malaria control staff, monitoring of spraying operations for safe handling and procedures, evaluation of effectiveness of insecticides used, compilation of provincial epidemiological and entomological data, preparation and dissemination of health educational material, public relations activities to make known the scope and benefits of the malaria control and a myriad of other responsibilities.

To accomplish these tasks each staff member of the DCMC has been assigned two or more responsibilities many of which are not in the scope of the individuals training and experience. This over-burdening and proliferation of duties resulted in very little being done effectively and timely.

Dr. Hashim Mallick, DCMC epidemiologist is also designated as safety officer and transport officer. As a Safety Officer, he should be in the field 75% of the time of spray operations, from June through October. I don't believe that he has spent over two weeks this year monitoring spray operations. Because of the myriad responsibilities he has been assigned at the DCMC his travel has been severely curtailed. He should be constantly making field visits and collecting epidemiological data so that timely evaluations of the effectiveness of malaria control activities could be made. He now depends on the Provincial Malaria Control staff to send him this data. Because of the nature of the bureaucratic beast, transmission of reports and data is always late. The analysis of this data is usually too late to uncover potential or latent problems and take timely corrective actions.

The same could be said of the entomologist, Dr. Mujahid, Scientific Officer. Most of his time is spent in Islamabad. Dr. Mujahid spends most of his time at DCMC involved in the Logistics of the entomological activities of the Provinces.

The DCMC in order to meet its responsibilities listed above needs should review its responsibilities and evaluate past performance in the carrying of these responsibilities. Immediate steps should be taken to recruit personnel in those areas found not covered by existing personnel and for which the DCMC has prime responsibilities.

## 5. Technical Assistance

### 1) World Health Organization:

The Conditions Precedent A. J. e. , of the Malaria Loan Agreement specifies that the World Health Organization, at the Borrower's request, agrees to provide five malaria technical experts in fields such as malaricology, epidemiology, program operations, laboratory administration and training. It was not until June 1977 that WHC recruited the above number.

Four of them are used in the monitoring of spray operations with emphasis on safe spray procedures. The WHC recruited three of the operations experts from the Pakistan Malaria Control Program. These men were then placed in the same province where they were previously working. The net result was no input of technical assistance into the program.

## 6. Safety

A major effort was made during the 1977 spraying season to prevent a recurrence of 1976's malathion intoxications and deaths. USAID was determined that if spray operations could <sup>not</sup> be executed safely, it would no longer support or associate with the program.

The success of this effort was far beyond expectations. No serious case of malathion intoxication was reported to date from any of the provinces. The GCF, WHC and AID constantly monitored spray operations for compliance with approved safety procedures. Orders were given that spray operations would cease if anyone was found in violation of these procedures. Spray operations were postponed from two weeks to a month until spray teams were supplied with protective clothing, impervious gloves, soap, and atropine was available in case of a case of a case of intoxication occurred.

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Five cholinesterase testing laboratories were set up for the Michel testing procedures and eighteen tintometric kits were distributed to the four provinces. Dr. Miller of CDC set up laboratories and trained personnel in the use of the Michel and Tintometric methods of blood cholinesterase level determinations. Dr. Eaker also of CDC helped the Malaria Control Program set up cholinesterase testing schedules to determine baseline and subsequent levels of cholinesterase blood levels of spray team members. Dr. Eaker scheduled that 10% of all spray personnel be tested prior to spraying and this control group be retested monthly throughout the spray season along with those workers suspected suffering from malathion intoxication. This proved to be impossible to accomplish with the number of trained personnel and tintometric kits on hand.

All malaria supervisors were trained to recognize physical symptoms of malathion intoxication and measures to take if a workman showed symptoms. Most of the supervisors were skilled in the injection of atropine, if not, then the suspect was taken to someone with expertise. Because the symptoms displayed by malathion intoxication are similar to many other ailments overtreatment resulted. As the treatment is benign there was no harm, with side or after affects.

AID, Washington was kept informed by monthly and special reports on the malaria control activities with special emphasis placed on safety.

The disposal of the 1976 Italian malathion has still not been resolved. The DCMC, at the writers recommendations, has contacted the Pakistan Department of Agriculture officials to determine if the insecticide could be reformulated and used for agricultural purposes. There has been no response at this time. Suggestions by CDC to neutralize with quicklime and burial were not appropriate for the large quantity to be disposed of and would have presented a grave health and environmental problem.

As stated previously, the prescribed safety procedures were adhered to, and constant monitoring and supervision by all concerned resulted in no <sup>serious</sup> reported cases of malathion intoxication. A remarkable record considering 1) the vast numbers of workers,

scattered throughout the country in primarily difficult areas to reach, 2) the high heats and humidities encountered by the workers when applying the malathion.

### Integration

Integration of all vertical health programs, i. e., Malaria Control Program into the basic health services is the ultimate goal of the Pakistan health infrastructure. The integration, however, should be so paced that the vertical programs should be near the fulfilling of their objectives prior to the transfer of personnel and resources to an undeveloped or non-existent horizontal health structure. The process of integration should be a gradual one, starting with the conferring of civil service status in the personnel of a vertical health program. Pilot studies are then made in specific areas where the vertical programs have reached or nearly reached their objectives. Vertical program personnel in these selected areas are given training in other health skills and existing basic health workers trained in the skills needed by the vertical program which is being absorbed. This transition continues until the entire area in which the vertical program is operating has reached the objectives designed for it. Before this is done, however, a fully developed plan, both technical and administrative, has to be made available. Personnel of both the vertical program and basic health services have to have close communion so that everyone knows their responsibilities and authorities in the new organization. This integration process is long, complicated and tedious and is usually accompanied by fear, frustration and hesitation by all parties concerned. It is a difficult task to accomplish even when all stumbling blocks are removed and conflicting responsibilities and authorities are resolved.

The North-West Frontier, Sind and Baluchistan provinces had already by 1976 administratively absorbed the Malaria Control Program into the health services by conferring tenure and civil service status on the malaria personnel. The North-West Frontier Province had also developed a plan for functional integration of a number of areas where the malaria incidence was reduced to a manageable level and could be maintained by the basic health services given training and new responsibilities. This plan will be implemented late in 1977 and continue through 1978.

The Punjab Province on the 7th July integrated the Malaria Control Program both administratively and functionally into a Communicable Disease Center (CDC) which is part of the overall health services. In the integration, many trained malaria workers were surplus and made available to other government organizations. Responsibilities and authorities were not well defined and resulted in confusion and loss of morale. Administrative procedures were not designed clearly designating how and by who had responsibility and authority to schedule work, make payments to personnel, casual labor and contracted services and supplies.

This integration coincided with the spray operation season and resulted in delayed payment of personnel and casual labor and reduced effectiveness of the entire spray operation. Casual labor was not paid for over two and one half months. There was no funds available to buy petrol so that supervision was hampered. Operational effectiveness was seriously reduced and the spray operations were delayed so that the second round of spray will, most likely not be complete.

A series of meetings were held between the Health, malaria officials WHC and AID staff to determine how to remove administrative road blocks which delayed supply, staff and casual labor payments. Meetings were held in Lahore during the first week of October by the JGMC, Secretary of Health, Health Department officials, the Deputy Secretary of CDC and Punjab malaria control officials to determine how to release funds so that the second spray cycle would be restated. After the long delay, it is doubtful that the second spraying would be accomplished in time to prevent transmission of malaria. To spray after the middle of October when transmission is diminishing rapidly seems like a waste of insecticides, money and manpower. The insecticides saved, by not spraying, could be used for the first 1978 spray cycle, which could then start prior to the first transmission peak (early June). Newly purchased insecticides would be distributed and ready for use long before the onset of the second transmission cycle peak in August.

The Laboratory analyses of 1975-76 malathion by both WHC and CDE in April 1977 showed that chemical deterioration did not occur as rapidly as expected and that the insecticidal properties of the

1975-76 had not diminished. There is no reason to believe that the 1976-77 malathion would not hold up as well. Because of the late start-up of the first cycle, high ratio-of refusal to spray and almost no second spray cycle in the Punjab, it is expected that sufficient insecticide will be available for use to fulfil the first 1978 spray cycle requirements.

### Recommendations and Conclusions

As an adviser looking over a large complex program such as the Pakistan Malaria Control Program, a program which employs upto 25,000 people of various skills, experiences, talents and education or lack of these skills, it would be very simple to find a myriad of areas to suggest where the efficiency, effectiveness, and productivity of the program could be enhanced. To take this approach would have, in my estimation, a negative attitude and approach and complete disregard for the tremendous progress and impact the program has made in the economic and health environment of Pakistan. To expect perfection in an imperfect world using goals that are unobtainable even in highly developed countries is just wishful thinking.

The Pakistan Malaria Control Program has in the years 1976 and 1977 sprayed over 8.2 million houses annually and protected an estimated 47.6 million people from the ravages of malaria. The malaria slide positivity rate has gone down over 45% after the 1976 spray operations. Preliminary epidemiological data of the 1977 spray operations shown an even greater reduction of malaria. The falciparum vivax ratio has gone from 60% or better down to 5% or less in some areas. As a conservative estimate, tens of thousands of people are alive today and millions of people are well because of the Malaria Control Program.

Rather than recommending, as stated before, a myriad and large number of changes that would improve, to varying degrees, the Malaria Control Program, I would like to see improvement in the recruitment and training of technical and support personnel starting at the DCMC, Provincial and District Level which would improve all phases of the program.

### Directorate of Malaria Control

The DCMC has the responsibility for direction, advising, evaluation and supplying the Provincial Malaria Control Programs with insecticides equipment and supplies. Only three persons are available to implement these responsibilities. Shortage of personnel is especially acute in the epidemiological and entomological fields. This shortage has resulted in slow and delayed reporting of project progress and results. Statistics and data are compiled at the district level forwarded to the Provincial level analysed and then mailed to the DCMC for analysis by the epidemiologist and scientific officer. A process which takes a month or more to complete. Latent and potential problems are not discovered in time for needed actions to be implemented. The DCMC should double its technical staff so that one of each discipline would be in the field at all times conferring with their provincial malaria control counterparts, gathering and analysing statistics and data and recommending program changes as needed.

### Provincial Malaria Control Centers

What has been said of the DCMC is also true at the Provincial levels. There should be improved coordination between District Malaria Control and the Provincial Control personnel. Staff should be strengthened so that supervision, consultation and gathering of data and statistics are constantly in progress.

The Provinces should also immediately recruit personnel needed to advise on and coordinate the urban malaria control programs in their respective provinces. Three months have elapsed since the GCF has approved the Urban Malaria Control Project, but because of personnel shortages very little has been done toward implementation.

This increase of personnel implies training of people for new responsibilities and skills. Curricula design, recruitment of trainers, selection of trainees and arranging for training facilities take long periods of time. The DCMC should start the process immediately if the additional personnel will be available as support in calendar year 1978 malaria control program.

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