

PD AAM-933
ISN-300 96

391 0472/17

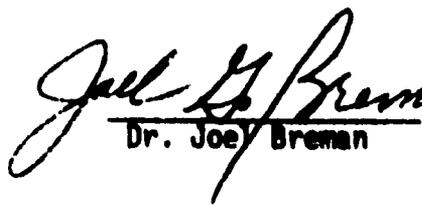
REPORT OF MALARIA EXTERNAL REVIEW TEAM.

PART I

Surveillance of Malaria
Chemotherapy of Malaria

April 18 - May 3, 1983

ISLAMABAD, PAKISTAN


Dr. Joe Breman

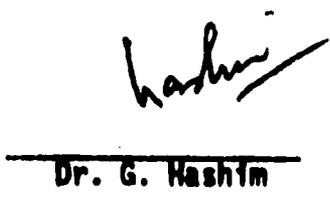

Dr. Frank Richards


Dr. L. Bosch


Dr. L. F. Delfino


Dr. William Chin


Dr. Rifaq A. Ismail


Dr. G. Washim


Dr. A. A. Mujaheed

External Review of the Pakistan Malaria Control Program, Part-I

16 April - 3 May 1983

I. SUMMARY AND RESUME OF CONCLUSIONS AND RECOMMENDATIONS

II. INTRODUCTION

- A. Background of the Malaria Control**
- B. Previous External Reviews and Recommendations**

III. EXTERNAL REVIEW - 1983

- A. Team Members**
- B. Terms of Reference**
- C. Methods**

IV. SURVEILLANCE FINDINGS

A. Punjab

- 1. Surveillance Objectives**
- 2. Organization of Surveillance**
 - a. Active case detection**
 - b. Passive case detection**
 - c. Smear reading**
- 3. Use of Data for Program Planning**
- 4. Special Studies**
- 5. National Malaria Training Center**

B. Sind Malaria Control Program

- 1. Surveillance**
- 2. Active Case Detection**
- 3. Passive Case Detection**
- 4. Special Studies**
- 5. Collection surveillance data**
- 6. Smear collection and examination**
- 7. Use of Data for program planning**
- 8. Indications for insecticide spray**
- 9. Urban malaria - Karachi**

C. North West Frontier Province

- 1. Surveillance objectives**
- 2. Organization**
- 3. Active Case Detection**
- 4. Passive Case Detection**
- 5. Smear reading**

D. Baluchistan Province

1. Surveillance
2. Active Case Detection
3. Passive Case Detection
4. Special Studies
5. Smear collection
6. Use of data for program planning

V. CHEMOTHERAPY FINDINGS

A. Drugs used in the Provinces

1. Types of Antimalarials
2. Treatment Regimens
3. Supervision of Treatment

B. Role of drugs in the Control Program

1. Standardization of drug procurement
2. Chloroquine resistant falciparum malaria
3. Treatment of vivax infections

C. Drug Sensitivity Testing

VI. Conclusions and Recommendations

VII. Acknowledgements

VIII. References

IX. Annexes

ABBREVIATIONS USED IN REPORT

ABER	:	Annual Blood Examination Rate
ACD	:	Active Case Detection
APCD	:	Activated Passive Case Detection
API	:	Annual Parasite Incidence
BHS	:	Basic Health Services
CDC Atlanta	:	Centers for Disease Control, Atlanta, Georgia
CDC	:	Communicable Disease Control
CHW	:	Community Health Worker
DDHS	:	Deputy Director Health Services
DHO	:	District Health Officer
DHS	:	Director Health Services
DMCO	:	District Malaria Control Officer
DOMC	:	Directorate of Malaria Control
EPI	:	Expanded Program on Immunization
ERT	:	External Review Team
GOP	:	Government of Pakistan
GR	:	Geographical Reconnaissance
HE	:	Health Education
ICMRT	:	International Center for Medical Research and Training, Lahore
MCP	:	Malaria Control Program
NMTC	:	National Malaria Training Center, Lahore
NWFP	:	North West Frontier Province
OP	:	Organophosphate
PCI Form	:	A Government of Pakistan planning document similar to the Project Paper

SPR : **Slide Positivity Rate**
ULV : **Ultra Low Volume**
WHO : **World Health Organization**

I. SUMMARY

An External Review Team (ERT), convened by the USAID was in Pakistan from 16 April to 3 May, 1983 to evaluate the surveillance and chemotherapy components of the National Malaria Control Program (MCP). The team studied many MCP documents as well as reports of previous external reviews from 1975 through 1981. The team then established the criteria for use in selecting places to visit in the field and prepared a standardized questionnaire for data collection. The team was divided into 2 groups and spent 9 days in the field. Twelve districts in the 4 Provinces were visited. We met with numerous health workers, administrators and village residents. The ERT reconvened in Islamabad on 26 April to discuss the findings and to write the report. The recommendations focused on exploiting maximally the existing and developing health services infrastructure as a surveillance resource in rural and urban areas. Our aim also was to promote the efficient utilization of scarce resources including insecticides and drugs, based on adequate and reliable epidemiologic information. Lastly, the team felt that for malaria control efforts to succeed in Pakistan, multisectoral cooperation must be secured from municipal authorities, from other health services and from the community members. In this regard, malaria control must be viewed not as a concern solely of the MCP but as a high priority national health problem.

RESUME OF CONCLUSIONS AND RECOMMENDATIONS

Malaria will be an endemic disease in Pakistan for many years to come. This infection will cease to be a public health problem only when the economic and social development of the country is sufficient to bring about significant improvement in living conditions and in medical services. Taking this long-range view, the best way to secure and maintain adequate malaria control is to promote self-reliance and to use scarce national resources with optimal efficiency; this is noted because the malaria program must compete with other health priorities for a limited budget.

Experience in disease control indicates that the utilization of accurate epidemiologic data in planning is absolutely essential to ensure efficient implementation of programs. The current collection, recording, and use of epidemiologic data in Pakistan by the Malaria Control Program (MCP) is inefficient; the External Review Team (ERT) estimates that at least 70-80% of the malaria cases are not being detected by the present MCP surveillance system because the other primary health care programs have, to date, made little contribution to the surveillance of this important health problem. The ERT concludes that the MCP operations, in the absence of more complete and reliable epidemiologic data, are unlikely to be carried out with sufficient effectiveness to ensure the efficient utilization of the scant resources available.

It is evident that elements of a good information gathering system exist in Pakistan. The laboratory system functions well and large numbers of patients with possible malaria utilize recognized health facilities that could be used as part of a standard MCP surveillance system. In view of these conditions, the team recommends:

1. Detection of cases through the Passive Case Detection (PCD) system should be strengthened by attaching more malaria workers to permanent posts at important health facilities. We urge that directives be issued by the highest health authorities at the Federal level for assuring that health facilities actively take measures to support the MCP program in case detection and recording of epidemiologic information.
2. The surveillance activities of the active case detection (ACD) worker should be substantially modified; his time should be used for the more efficient functions of PCD and for special surveys, case treatment and follow-up, and supervision of vector control activities. It is recommended that this important change in field workers' functions be initiated as soon as possible in some districts and be carefully evaluated. We caution that the recommendation to modify routine ACD activity should not be taken as a suggestion to divert ACD workers to other health activities to the detriment of the MCP. On the contrary, we stress the importance of maintaining these personnel in malaria control and using them more effectively.

3. Epidemiologic information that is available should be collected and analyzed in a more scientific manner in order to logically direct spray operations. We recommend that the annual blood examination rate (ABER), the annual parasite incidence (API), and the ratio of positive Plasmodium falciparum slides, in addition to entomologic information be used for program planning and targeting of insecticide.
4. Realistic goals should be established for the level of control desired, based on an accurate case detection and reporting system. There should be a national objective of no more than 0.5 cases per 1000 persons per year.
5. A Committee should be established within one month, consisting of representatives from the MCP, National Malaria Training Center (NMTTC) USAID and WHO, with the objective of constructing guidelines within three months which would standardize the approach to surveillance and include updated criteria and procedures for the investigation and treatment of malaria cases, the conduct of special epidemiologic studies, and the use of epidemiologic data in program planning.
6. A Malaria bulletin should be established at the national level for keeping intermediate level field staff current on developments in malaria in Pakistan. This bulletin should be brief, and distributed quarterly.
7. Efforts should be made to promote community participation and improve the morale of MCP field workers.

The Malaria treatment regimens for the MCP are not standardized for the country and even a simple single dose presumptive treatment has been made unnecessarily complicated in order to conform to a multitude of drugs procured from various sources. We found 13 different antimalarial preparations being used by the MCP; some of these drugs have dubious value and their use may promote development of resistance to alternatives to chloroquine.

In many areas of Pakistan, the prevalence of malaria due to P. falciparum is high and appears to be rising. The MCP should view this situation with greater concern since the development of chloroquine resistance by this parasite will not only make malaria control more difficult but carries with it the threat of causing an increase in malaria-related mortality. In view of this, we recommend that:

1. Drugs such as pyrimethamine and inappropriately proportioned chloroquine-primaquine combination no longer be procured.
2. Chloroquine should be the only 4-aminoquinoline for use by the MCP to treat acute attacks, reserving the existing stock of amodiaquine for contingency needs.
3. The presumptive regimen treatment be standardized to a dosage of chloroquine 10mg base/kg plus primaquine 0.5mg base/kg.

4. Routine radical treatment for P.vivax malaria be discontinued.
5. Radical treatment of P. falciparum malaria be standardized to a dosage of chloroquine 25mg base/kg over 3 days, plus one dose of primaquine, 0.5mg base/kg.
6. Continuous monitoring for the detection of chloroquine resistant strains of P. falciparum malaria be done in areas with a high prevalence of this parasite by the use of in-vivo and WHO micro in-vitro tests.

In addition to the above, other points related to the surveillance and chemotherapy of malaria were noted. We regret the delay to secure sanction for the creation of the operational research unit. Such a unit can help to solve the many technical problems presently confronting the MCP. Training of staff at all levels needs to be reviewed. Emphasis should continue to be on integrating malaria into the daily work of the basic health services. The infrastructure for urban malaria control exists throughout most municipalities. However, the importance of urban malaria within the country needs to be better defined. Surveillance for malaria needs to be improved greatly in urban centers. The slide positivity rate (SPRs) in Afghan refugees are the highest reported from any population group in Pakistan.

Addressing these issues we recommend that:

1. A program of operational research be carefully developed, budgeted and executed. The following activities deserve priority attention:
 - a. A redefinition of the role and activities of the ACD worker to improve the efficiency of their function.
 - b. Promotion of methods to make PCD posts more productive.
 - c. Monitoring the emergence of chloroquine resistant falciparum malaria by the use of in-vivo tests, supplemented by the WHO micro in-vitro test.
 - d. Evaluating the accuracy of clinically diagnosed malaria cases.
2. The National Malaria Training Center (NMTTC) needs to be strengthened.
3. In regard to urban malaria, the collection of epidemiologic data and the establishment of efficient inter-sectoral cooperation is absolutely necessary for problems to be defined and objectives established and achieved. The following is recommended:
 - a. The establishment of an Urban Malaria Board.
 - b. Passive case detection should be properly organized in all urban health establishments.

- c. Longitudinal parasitologic surveys of segments of the urban/peri-urban population should be conducted on a yearly basis with assistance, if required, provided by the provincial MCP.
4. A large scale health education campaign focusing on malaria should be coordinated at the national, provincial and district levels to take advantage of health education programs already existing in other government agencies.
5. Coordination and cooperation should be strengthened between agencies concerned with health in refugee camps and malaria personnel at the Federal and Provincial levels.

II. INTRODUCTION

A. Background of the Malaria Control Program:

During the eradication era, when there was generally ample funding provided by external sources, access to accurate epidemiologic data was relatively unimportant because the antimalaria method used was based on total coverage of houses in endemic areas with a residual insecticide. In the present era of malaria control, implementation of the program is dependent mainly on local resources. This means that any disease control program operates within the frame work of national, provincial and local government rules and regulations. At the same time the malaria program, like others, must compete with other priority health programs for funds from a meager health budget.

To be successful, each control program must have reliable epidemiologic data to guide the selection of appropriate control measures and to target those measures to areas of need. Thus, the first requirement of a malaria control program is a reliable surveillance system. A second requirement is the use of an effective alternative control method to supplement, and in some cases replace, the house spraying approach. In recognition that insecticide costs (as well as the danger of toxicity to spraymen) are increasing to the point whereby the national government can no longer afford them, the Malaria Control II Project was conceived to redirect the malaria control effort in Pakistan from one based exclusively on eradication, relying on the spraying of insecticides, to one of control. How successful this redirection is implemented will determine the extent and duration of USAID support for the remainder of the Malaria Control II Project.

It should be emphasized that, according to the Project Agreement, the release of funds to procure insecticides is conditional on the demonstration by the Malaria Control Program (MCP) that they have been effectively used during the preceding spray season. Until there is a reliable surveillance system in place to guide the judicious use of insecticides, this condition cannot be met. For these reasons, this external review was modified to focus on surveillance and on a major alternative control measure, chemotherapy.

Chemotherapy was also included because it was noted that a confusing array of drug regimens were being used throughout the country. Related to this is the concern that strains of P.falciparum in Pakistan may develop resistance to antimalarial drugs as is the case in India.

B. Previous External Reviews and Recommendations:

Major recommendations on the subject of surveillance of malaria made by the previous External Review Teams include the following:

1. Develop capability for rapid analysis of data and response to epidemic malaria.
2. Establish effective PCD system.
3. Expand PCD by activating with malaria staff.

4. Implement voluntary collaborator plan in MWFP.
5. Fill provincial epidemiologist positions.

The team notes with regret that except for a beginning attempt at implementing recommendation No. 3, no actions have been taken on any of the other recommendations.

Past recommendations on chemotherapy have been noticeably scanty and may reflect the lack of an in-depth evaluation of this aspect of the program. General recommendations do appear occasionally and they focus on standardizing treatment regimens and on increasing efforts at achieving a higher percentage of radical treatment administration. These recommendations have also not been implemented.

III. EXTERNAL REVIEW TEAM

A. Team Members:

The composition of the External Review Team, Part I were as follows:

1. Dr. Joel Berman : Chief Malaria Control Activities, Malaria Branch, Division of Parasitic Diseases, CDC, Atlanta
2. Dr. Frank Richards : Helminthic Disease Branch, Division of Parasitic Disease, CDC, Atlanta
3. Dr. L. Boschi : Malaria Advisor, WHO, Islamabad
4. Dr. L.F. Delfini : Regional Malaria Advisor, Eastern Mediterranean Region, WHO
5. Dr. William Chin : Malaria Advisor, USAID/Islamabad
6. Dr. Rifaq A. Ismail : Public Health Physician, HPN, USAID/Islamabad
7. Dr. G. Hashim : Epidemiologist, Directorate of Malaria Control (DOMC)
8. Ch. A.A. Mujahid : Entomologist, (DOMC)

B. Terms of references

1. Assess the adequacy of the surveillance operation in rural and urban areas for a malaria control program; identify weaknesses and recommend specific measures for improvement.

2. As part of surveillance, to assess the adequacy of laboratory operations with attention to performance output, accuracy and turn over time of blood smear examination from receipt to reporting of results.

3. Assess the current status of malaria chemotherapy with emphasis on the following aspects:

- a. Drugs - availability and procurement procedures.
- b. Adequacy of presumptive and radical treatment regimens including timeliness of treatment.
- c. Issue of supervised vs. unsupervised treatment.
- d. Present measures for the monitoring of chloroquine resistant falciparum malaria

C. Methods

Prior to visiting the Provinces the ERT came to a consensus on what was felt to be the important issues to be examined during the review. Questions to be answered were devised, and formalized in writing, to be used in guiding ERT evaluation of existing provincial epidemiologic and chemotherapeutic approaches to malaria control. The resulting questionnaires are provided in Annex A.

The ERT then proceeded to its scheduled appointments at the provincial headquarters of the various MCPs. After discussions with the Provincial Chiefs, site visits were made to one or two locations in the field in order to examine data and interview MCP personnel at the district, sector and sub-sector level. Whenever possible, discussions were held with pharmacists, physicians, lab technicians, and the local populace. The list of contacts who ultimately contributed to information that the ERT used in compiling this report are listed in Annex B.

IV. SURVEILLANCE FINDINGS

A. Punjab

Punjab Province (population 47,116,000 - 1981) has 56% of the population and the highest population density (229 persons/km²). Malaria transmission in Punjab has been more intense than elsewhere mainly because of the relatively high water table, climatologic conditions, and other factors favourable to anophaline mosquito breeding. In 1982 the MCP reported 27,095 malaria cases. These are the highest numbers reported since 1977 (see Table I). The ABER has remained essentially the same for the past 6 years. However, the API is rising, being 0.71/1000 in 1982. Plasmodium falciparum, the more severe form of malaria, comprised almost 40% of the cases reported in 1982.

1. Surveillance Objectives

In Punjab the Program Plan, 1983, called for a number of

TABLE I

Malaria in the Punjab, 1976-1983*

<u>Year</u>	<u>Cases</u>	<u>ABER¹</u>	<u>API²</u>	<u>SPR³</u>	<u>% P. falciparum</u>
1976	105,552	6.1%	3.23	5.3%	31.1%
1977	36,920	4.8	0.11	2.1	27.0
1978	7,820	3.8	0.22	0.5	21.6
1979	5,820	4.1	0.16	0.3	41.8
1980	9,537	4.7	0.02	0.5	20.3
1981	17,419	4.3	0.40	1.0	14.1
1982	27,095	4.3	0.71	1.5	25.2
1983 ⁴	1,810	0.6	0.04	0.8	37.1

* Source: Assistant Director for Health Services (Malaria), Punjab

1. Annual blood examination rate (slides collected/total population)
2. Annual parasite incidence (slides positive/1000 population)
3. Slide positivity rate (slides positive/slides collected)
4. Through February

surveillance activities by ACD and PCD workers in terms of places to be visited, frequency of visits, slides to be collected, treatment to be given etc. However, there were no precise epidemiologic indications for dividing the province into high middle or low "malarigenic" areas, although these designations had already been established.

2. Organization of Surveillance

There are 27 districts in the Punjab and these form 5 divisions. The districts have between 1.3 and 4.7 million persons each. As in other provinces, Punjab relied, until the mid - 1970's, on the ACD field worker to detect cases as an adjunct to the residual spray operations. However, in 1976 a national policy to integrate malaria workers into the basic health services was promulgated. This policy was accepted more in the Punjab than elsewhere. The result was that instead of improving malaria work in the general health services, many malaria workers were given other tasks. The result was that intensity of case detection and smear taking suffered in both the villages and field health centers. This was because health service personnel thought that all malaria related work was to be done by malaria staff. This misperception continues in great part today.

a. Active Case Detection

Despite the recommendations to integrate, in most districts the ACD workers still attempt to perform their house-to-house visits, despite having perhaps 30,000 persons to cover, a number in most instances more than twice as large as initially planned. Considering that there are 6 persons per house, and that the ACD worker could be in the field no more than 21 days a month, he would have to visit almost 1,500 persons daily or 250 families to do the work. This approach was intended when the strategy was one of eradication and not control. In addition, to assure each area was covered properly would require support and supervision, and added transport because of the substantial distance between locations. These added resources did not appear forthcoming for ACD.

The ERT did indeed find ACD workers going about their house-to-house visits, taking smears etc. according to a properly drawn up schedule. In Sheikhpura and Gujrat districts "malaria visit cards" were maintained in the homes and were signed by the ACD workers each month. Supervision by malaria superintendents was adequate. There were 1,537,225 slides collected by the ACD system in 1982, representing 85% of all slides taken in the Province; 96% of the slides were collected by ACD workers.

All houses seen had GR numbers painted on them and the people in the villages seemed aware of the ACD work. However, the families and representatives of the union councils stated that if they were

severely ill or had fever when the ACD worker was not present, they would certainly go to the nearest health facility. It is only the more mild cases of fever or those that begin on the day or so before the ACD visit that come to the attention of the ACD worker. At one school in Gujrat District, the ACD worker was distributing drugs (Darachlor - combination of pyrimethamine and chloroquine) to school children on a monthly basis. It was not possible to evaluate other functions of the ACD worker, particularly those related to spraying operations.

b. Passive Case Detection

Passive case detection by the MCP is providing only 15% of the total slides collected. Of the 7489 potential PCD posts only about 10% of these are being exploited for case notification and slide collection. MCP staff say that health post personnel are not interested in malaria and will not take smears. Staff at the health posts visited did seem interested and concerned about malaria although more from the curative than the preventive aspect. They said that if slide collection materials were provided to them and if slides were picked up and the results transmitted promptly, that their units would be willing to participate in MCP surveillance. In fact, many ACD workers appear to be spending a few vaguely defined hours each day in health units taking some smears from patients with fever. In some instances, this amounts to only 1-2 slides per day.

What was not generally perceived by the MCP was that the health services are seeing large numbers of patients in the Punjab with clinical malaria. Reports for 1980 (Statistics of Hospitals and Dispensaries etc. in the Punjab for the year 1980, Provincial Health Directorate, Punjab, Lahore) showed 499,588 out-patient visits, 3,493 admissions and 12 deaths due to malaria diagnosed clinically.

The slide positivity rate (SPR) of 4.0% for smears from PCD was 3.3 times that for ACD (1.2%) in 1982. Applying the SPRs to the Punjab health service data it is estimated that at least 20,123 cases of slide confirmed malaria were coming to the health units. However, only 3,678 (18%) of them were detected. This is almost 10% more than the number of cases being reported by the ACD system. Clearly the existing and developing health service infrastructure could provide an excellent base of surveillance if given training and support.

c. Smear Examination

Smear reading at the provincial and district levels appeared good on the whole. The number of microscopists available, their training and supervision was quite satisfactory. Identification

of the parasite species appeared to be accurate, as judged by results of the cross-checking survey system reviewed at the district level and between the district and province. A microscopist reads about 50 slides per day (range about 30-70).

A major problem with the system exists with collection of the slides and with delays in getting slides promptly to the laboratory and the results back to the field. ACD and PCD workers only had one instrument, a metal lancet, for taking blood smears and a small amount of alcohol for cleaning it. Further, the slides used were generally old and scratched, due to being cleaned and reprocessed so many times.

The attached Table II indicates the delay time during slide processing in 1982. Close to 75% of slides come to district laboratories within one week after collection and over two-thirds of slides are read within two weeks. Hence two-thirds of slides are reported in less than 22 days but a further delay must be added for delivery of results and treatment of persons with positive slides. This situation can be improved by assuring more rapid pick-up and transport particularly in areas having a high incidence of *P.falciparum* infections.

3. Use of Data for Program Planning

Punjab province is divided into high, middle and low "malarionogenic areas" and insecticide provisions are based on this; 70% of the population and 13 of the districts are included as high priority areas. Criteria are imprecise for establishing priorities. In general, areas which had many malaria cases in previous years seem to have the greatest chance of being sprayed again. Age, sex and mortality data are not being routinely collected. Data on localities where cases are occurring, seasonality, number of ACD and PCD slides taken, slides positive and species are available but are not being used except for planning, particularly at the district level. Use of rates (especially ABER, API) and the percent of *P. falciparum* cases occurring should be major factors used in apportioning resources.

4. Special Studies

The ERT reviewed the urban malaria situation in Lahore with Municipal Corporation officials. The major surveillance problem was that cases of fever, pyrexia of unknown origin (PUO) were not being reported from the many health facilities in the city to communicable disease officials. As a result, conclusions on human malaria in Lahore for 1982 could only be based on the fact that, of 800 slides taken by a special survey, none were positive. A fair amount of entomologic and environmental information had been collected by Dr. Boschi of WHO working with local authorities. Anopheles Stephensi breeding sites do exist, particularly in the periphery of the city. We visited some areas where water collection (ponds) were being treated by clearance of bush, larviciding, and (in one instance) adulticiding.

TABLE II

Slide Processing Punjab Province, 1983

Number of Days

To receive slide:

1 - 3	25.9%	}	73.4%
4 - 7	37.5%		
>7	36.6%		

To examine slide:

1 - 7	32.7%	}	65.5%
8 - 15	32.8%		
16 - 20	14.2%		
21 - 30	9.8%		
>30	10.6%		

Urban malaria (at least in Lahore) does not appear to be a problem. However, suggestions were made to gather data to affirm or deny this contention. An integrated mosquito control activity makes more sense and, with WHO support, appears to be developing very nicely in Lahore.

5. National Malaria Training Center

The NMTC has 13 courses scheduled for 1982-83. These cover microscopy, urban malaria, safe use of insecticides, general malariology for mid-and senior-level staff, parasitology and entomology. Courses on malaria for district health officers have begun and will continue.

The NMTC is scheduled to move to a new building to be purchased by USAID. The move has not yet occurred due to a delay in obtaining official sanction for the creation of an operational research unit. But, this and the establishment of six new posts is expected to be resolved soon. The NMTC also has been involved in drug sensitivity testing. Most recently, in Sheikhpura district, there were 2 instances of patent parasitemia reappearing 14 and 18 days respectively, following treatment; 58 other in-vivo tests done in the same area at the same time all showed sensitivity to chloroquine. Since 1974, 359 in-vivo tests have been conducted, almost all in the Punjab (See Table III). Except for the 2 suspected resistant cases mentioned, there is no other evidence of resistance. There is a plan to promote sensitivity testing using WHO in-vitro test kits; some Pakistan MCP staff have been trained for this. It is very important that surveillance for drug resistant strains continue and that this activity becomes a well defined area of operational research.

B. Sind

In 1982, in Sind Province, the ABER was 2.8% and the API 0.38 cases/1000 persons. The SPR was 1.3% with P. falciparum comprising 47% of all slide positive cases.

The Sind MCP headquartered in Hyderabad, is currently directed by a trained surgeon who has been with the MCP only 2 months. Little compiled information, and no written Plan of Action for 1982-83 were available from the Provincial Headquarters. (No Plan of Action for the Sind has been prepared since 1980-81). Much of the data presented in this section was compiled by the team while visiting the Dadu District, northwest of Hyderabad.

1. Surveillance

The Sind Province, after the Punjab, has the greatest malarigenic potential. It is the second most populous province and includes the largest city, Karachi, which had a large malaria outbreak in 1976. The thirteen districts of the province are divided into approximately 600 subsectors, which are the basic units of surveillance operations.

TABLE III**Chloroquine Sensitivity of P. falciparum**
Pakistan

Year	Method	Districts	No. of Tests	Finding
1974	In-vivo	Faisalabad, Muzaffargarh, D.G. Khan, (Punjab)	36	Sensitive + Suspicious R. I. Level
1976	In-vitro	Jhang, Muzaffargarh, D.G. Khan (Punjab)	50	Sensitive
1977	In-vivo	D.G. Khan	58	Sensitive
1978	In-vivo	Bhawalpur (Punjab)	28	Sensitive
1980	In-vivo	Gujrat (Punjab)	60	Sensitive
1981	In-vivo	Sheikhupura (Punjab)	60	Sensitive = 58 RI = 2 cases
1981 (JAN)	In-vivo	Shakarpur (Sind)	28	Sensitive
1983	In-vivo	Sheikhupura (Punjab)	39	Sensitive

2. Active Case Detection

Active case detection in Sind generated 365,047 malaria blood slides in 1982. This represented 71% of all blood smears collected in the province. The SPR in slides produced by ACD in the Sind was 0.9%. The positivity of slides collected by ACD was 2.5 times less than those obtained by PCD. No data was available from the surveillance results for age and sex of persons from whom smears were taken. Address was recorded by subsector, not village of residence.

In the Dadu district, 61% of the malaria supervisors were working full time in ACD operations. The malaria supervisor is expected to make monthly evaluation of 15-20 villages; the average population under his surveillance is 26,000. Despite the magnitude of this task, there is no apparent daily schedule, benefit of transport, or supervision. In addition, there is great resistance to the ACD activity among the population, and frequently the ACD worker is not allowed to enter their homes to obtain information and blood smears. In order to meet quotas, ACD slides are commonly obtained from school children. Due to cultural reasons, it is estimated that no more than 10% of ACD slides are taken from women. Motivation among the ACD workers was found to be low. For example, one such worker in Dadu covered less than six houses per day: in one month he distributed seven chloroquine tabs and obtained only two slides. In the one village visited by the ERT, household malaria cards were not present. Even though the ACD system provides 71% of all collected slides in the Sind, it appeared inefficient and interfered with the other functions of the ACD workers such as GR, case follow-up and treatment, and identification of breeding sites.

3. Passive Case Detection

The integration of malaria surveillance into the general health system calls for the establishment of PCD posts at government hospitals, rural health centers, local dispensaries etc. These facilities do not produce blood smears from fever cases unless a malaria worker was present to take them. Therefore, the PCD contributions discussed should be considered "Activated PCD" (APCD). In 1982, 20% of all slides collected were from the APCD system. The slide positivity rate in slides produced by APCD was 2.4%, with a falciparum rate of 0.97%. No data was available for age and sex, and case locality was classified only by the health facility, where the blood smear was taken.

In Dadu district, 14 of 54 (26%) malaria supervisors were on permanent PCD duty. This provided coverage for only 14 (48%) of the 29 health facilities in the district. Slides were not collected

by other health units. The following table illustrates the efficiency of slide production and case detection, per worker, in ACD versus PCD:

Table IV - Dadu District 1982, Smear production by source

Type	Total Smears	(+) Smears	falcip. Cases	SPR	Slides/Worker/day	Cases detected/worker/month
PCD	5089	173	18	3.4	1.2	12(9)*
ACD	26,699	607	97	2.3**	2.2	15(6)*

* The SPRs for the Province are applied (PCD-2.4%, ACD-0.9%)

** This SPR is unusually high for ACD, the average for Sind Province is 0.9.

The PCD worker produced half as many slides as the ACD worker per day but the number of cases detected per worker was nearly the same. It should be noted that in 1982, Dadu district had an unusually high SPR (2.3%) among their ACD slides.

The efficiency of APCD in Dadu in 1982 can be evaluated by examining the total numbers of fever cases recorded by government health facilities. In that year, 35,032 patients in the district were diagnosed as having "Pyrexia of Unknown Origin" or "Clinical Malaria". Since only 5089 slides were sent in from APCD posts, 84.4% of patients with possible malaria did not have blood examination. Therefore, operating at 15% efficiency, the PCD system still generates as many positive slides per worker as ACD. The PCD method of surveillance can be substantially improved with relatively little effort. Theoretically, blood examination from 75% of the patients presenting to government clinics with PUO or clinical malaria would increase the workload of the present Dadu APCD workers to only 6.3 slides per day and would generate as many slides per year as the ACD effort in the district.

4. Special Studies

There was no evidence that any special epidemiologic studies were carried out to evaluate possible areas of high malaria prevalence in 1982.

5. Collection of Surveillance Data

Annual Reports of cases of clinical malaria and deaths from malaria and other diseases are compiled and sent to the Provincial Health Services by all districts in the Sind. The Sind Malaria Control Program makes no use of any of these data in its surveillance. Province wide information from health units was not available during the ERT visit. However, data were obtained from Dadu for cases presenting with "Clinical Malaria" and "PUO" to clinics, hospitals, and dispensaries in the district, and are presented in the following table:

Table V - Clinically diagnosed Malaria and PUO in Dadu District, Sind Province

Locations	"PUO"/ "Clinical Malaria"	PCD Slides Obtained	% of cases with slides	No. Positive	SPR	Esti- mated cases of Mal- aria	% of True Malaria cases not reported to Malaria Program
Dadu District (1982)	35,032	5089	14.5	173	3.4	1225	85.8
Sehwan RHC Dadu (March 83)	237	41	16.6	4	9.7	23	82.6

It should be noted that when the SPR is available from a sample of these clinical malaria cases, one can estimate the number of actual malaria cases that are presented to that clinic and the percent of cases lost to the surveillance system by the failure to exam blood smears can be computed. Using data from Dadu Districts, 80-85% of patients with malaria who come to government facilities for treatment would appear to be missed by the current PCD surveillance activity. The percent of "Clinical Malaria" and "PUO" cases among the entire population of patients could also be used to estimate numbers of malaria cases and direct other epidemiologic investigations when looked at monthly.

Table VI - Amount of Clinical Malaria Seen in Health Facilities in March, 1983

Facility	Clinical Malaria/PUO	All Patients Seen	Percentage with Malaria/PUO
Dadu District	3813	24,402	16
Sehwan RHC Dadu	237	1328	18
BHAN RHC Dadu	263	1141	23
RHC Baluchistan	113	1839	6

For comparison, the figures for March, 1983 from a RHC in Baluchistan are given. The API in Baluchistan is one half that of the Sind (Annex C). This is roughly reflected in the amount of clinical malaria diagnosed.

6. Smear Collection and Examination

The Laboratory Services at the provincial and zonal level (represented by the Dadu Laboratory) appear properly run and reliable; as such they were the strongest aspect of the surveillance system in the Sind. A check of the Dadu Laboratory Record at the reference laboratory, Provincial Headquarters, showed only a 0.14 false negative rate for 5,500 slides checked. No false positives were detected out of 60 slides checked. Adequate supervision is present at both Provincial and District levels, although a high turnover rate for microscopists, due to low wages, remains as a problem. Internal processing time was on the average less than 5 days. Transportation time required to bring the slides from the field was variable and often averaged greater than one week. A distribution of slide delay time similar to that described for the Punjab was seen.

One shortcoming was noted in the Karachi Municipal system, where microscopists are detailed to large APCD posts for rapid staining and reading of malaria slides. The procedure of using 100% stain concentrate for variable short periods was inappropriate for rapid staining, and 30-40% of the slides present on the day of the visit were probably too overstained to allow diagnosis of light to moderate infections. This problem should have been noted by the reference provincial laboratory and corrected, but apparently was missed.

7. Use of Data for Program Planning

The surveillance data which are available in the Sind are not being exploited epidemiologically to respond to areas of increased incidence. The ERT found that there were no mechanisms, at either the district or provincial level, geared to trigger epidemiologic investigation of increased numbers of slides, increased ratios of falciparum, or high numbers of clinical malaria cases. There was no evidence that any investigations or special operations were carried out in areas demonstrating potential clusters of cases. Mapping of cases and attention to rates was not evident at any level; this was especially noticeable in Karachi district, where no graphs or maps of any kind were available. Innovation, flexibility and mobility of the epidemiologic units were lacking. The purpose of data collection for human malaria infections was only: 1) To identify patients for radical chemotherapy; and 2) To make operational decisions, primarily to designate which sub-sectors will be sprayed.

8. Indications for Insecticide Spraying

MCP authorities claim to base their decision on whether or not to spray a sub-sector solely on the absolute number of cases reported from that area during the year. However, even in this approach the method appeared to the ERT to be inconsistent and the critical number of reported cases required to trigger the decision to spray appeared to vary from sector to sector, and district to district.

An example of epidemiologic rates and the variability of the information they provide for ranking the prevalence of malaria in sub-sectors is presented in Table VII.

Sub-sector population data (used to calculate ABER and API) and total slides collected (used to calculate SPR) were not considered necessary at the provincial level and therefore, not available. This information was collected from Dadu district Headquarters, and calculations of ABER, API and SPR were performed by the ERT team. It can first be noted from this table that of the four sub-sectors selected for residual spraying, one (J-8) did not meet the apparent criteria for spraying of having the greatest numbers of reported cases. Only J-7 sector remains in the top four by all columns. J-2 is second in frequency of occurrence. It was felt by the ERT that API was probably the more important epidemiologic consideration which would reflect magnitude of the malaria cases within a population. However, use of API without considering entomologic information, is not recommended. It should also be noted that locality of cases obtained through PCD (10.4% of total slides collected in district) were considered indigenous to the sub-sector of the medical facility where the slides were collected, not the patient's village of residence. This results in a significant error when mapping cases, since the catchment areas of many active PCD centers span several sub-sectors.

9. Urban Malaria - Karachi

Karachi is an aggregate of numerous communities, under the jurisdiction of at least 22 governing bodies, corporations and municipal committees. In 1981 its population was 5,353,000.

Since 1976, the city has been a recognized center of malaria transmission. Numerous external reviews of the Karachi Malaria Program have presented detailed recommendations on control and surveillance measures. Unfortunately, few, if any, of the recommendations for improving the surveillance system appeared to the ERT to have been implemented, probably because of the lack of a central governing body in the city.

In 1982, 77,774 slides were examined by the MCP operating under the DHO in Karachi (ABER-1.4%). The SPR was 0.35 with 12% of those positive being P. falciparum. The API was 0.05 cases per 1000. This

TABLE VII

1983 Spray Plan : J. Sector, Dadu District - Sind*

Four sub-sectors selected by Sind MCP for spraying, based on epidemiologic data	order by absolute # of cases	order by SPR	order by $\frac{API}{1000}$	order by ABER (%)	order by falciparum rate
Sub-sector	Sub-sector #	Sub-sector SPR	Sub-sector API	Sub-sector ABER	Sub-sector
<u>J-7</u>	<u>J-7</u> (39)	<u>J-5</u> (2.4)	<u>J-7</u> (2.8)	<u>J-7</u> (14)	<u>J-6</u> (0.7)
<u>J-2</u>	<u>J-2</u> (27)	<u>J-2</u> (2.3)	<u>J-6</u> (1.7)	<u>J-4</u> (9.6)	<u>J-2</u> (0.6)
J-1	J-1 (23)	J-8 (2.1)	J-8 (1.5)	J-6 (9.5)	J-4)
J-8	J-6 (23)	J-7 (2.0)	J-2 (1.4)	J-1 (7.5)	J-5) (0.2)
-	J-8 (18)	J-6 (1.8)	J-1 (1.3)	J-8 (7.2)	J-7)
-	J-5 (11)	J-1 (1.7)	J-5 (.9)	J-9 (6.7)	J-8)
-	J-3 (11)	J-3 (1.2)	J-4 (.8)	J-2 (6.4)	J-1)
-	J-4 (10)	J-4 (0.9)	J-3 (.7)	J-3 (5.7)	J-3) (0.1)
-	J-9 (2)	J-9 (0.2)	J-9 (.1)	J-5 (4.0)	J-9)

* Full data from which these orders were derived are presented in Annex E.

was one of the few programs that reported male and female cases; 61% and 39%, respectively. ACD, which accounted for only 15% of total slides, was conducted by 12 supervisors (representing 30% of the field work force) who worked in periurban slum areas in the city. The SPR for ACD was 0.32%. APCD operates in the two major hospitals in the city, Jinnah Post Graduate Medical Center and the Civil Hospital. In addition, APCD workers are stationed in other clinics, hospitals and dispensaries throughout the city, covering approximately 46% of these facilities. Total slides collected by APCD was 60,596 or 78% of the total slides for 1982. The annual average output per APCD worker was 2164 slides for 1982, (as compared to Karachi ACD workers = 977). The SPR for APCD was 0.36%. Special surveys accounted for 7% of slides collected. Criteria for these special surveys were not adequately presented to the ERT.

The ERT visited the MCP and DHO office in Karachi, and regretted the lack of available maps for: 1) locations of the 28 APCD posts in the city, 2) location of areas where ACD was being performed, 3) place of residence of confirmed malaria cases. However, the subsectors identified as high incidence areas were those in which the two largest hospitals of Karachi were located and where APCD was most active; Jinnah Post Graduate Medical Center (SPR 1.2%) and Civil Hospital (SPR 1.9%). Data on the residence of slide proven malaria cases was not immediately available nor apparently used in surveillance operations. In addition, no rates were available at the MCP. All rates presented here were calculated by the ERT. The team also met the malaria superintendent of the Karachi Municipal Corporation. His responsibility, however, was primarily vector control through source reduction and larvaciding. He had little to no contact with or guidance from, the group involved in surveillance activities.

C. North West Frontier Province

NWFP (population 10,885,000 - 1981) has 13% of the national population and a population density of 80 persons/km²; 85% of the population is rural compared to 72% of the entire population. There are 11 districts, one protected area and a number of "Federally Administered Tribal Areas" adjoining and within the Province. Malaria is a fairly important health problem in NWFP but is not currently considered a severe disease by all health officials. The number of cases, the ABER and percent of P. falciparum cases since 1975 is shown in the Table VIII. Since 1978 the incidence of malaria appears to be increasing (from an API of 0.07 to 0.41); however, the percent of cases due to P. falciparum is decreasing. The ABER has remained essentially the same.

1. Surveillance Objectives

Objectives in NWFP are to keep the ACU system working in the rural areas and in the field health units during "peak hours". Use of surveillance data for dividing the districts into malarious and non-malarious areas has been done but not for further dividing the malarious areas into high, medium and low risk.

Table VIII
Malaria in North West Frontier Province
1975 - 1982

<u>Year</u>	<u>Cases</u>	<u>ABER</u>	<u>API</u>	<u>SPR</u>	<u>% P. falciparum</u>
1975	27,078	8.3%	2.94	3.5%	10.1%
1976	10,164	5.4	1.10	2.1	6.8
1977	1,894	5.5	0.21	0.4	4.7
1978	646	6.6	0.07	0.1	13.0
1979	1,815	5.4	0.17	0.3	21.4
1980	1,841	4.6	0.17	0.4	9.8
1981	3,987	5.5	0.37	0.7	7.2
1982	4,437	5.5	0.41	0.7	3.2

* Source: "Brief Report on Malaria Control Activities for 1981-82"

2. Organization of Surveillance

As in Punjab the ACD worker is responsible for one "sub-sector", a group of villages which form localities. The static health units see acutely ill patients. Here the ACD workers have been doing APCD at the health units in his jurisdiction. Surveillance data collected by the general health services is not used by the MCP, if it is not collected by the APCD system. Apart from APCD there are no major efforts being made in NWFP to integrate the MCP into the general health services.

3. Active Case Detection

In NWFP, the number of persons to be visited by the ACD worker increased as elsewhere. Of the 603,602 smears collected in 1982, 86% were collected by the ACD worker. The SPR for ACD was 0.38. Workers were found to have been visiting their assigned villages in Mardan and Swat districts. The household malaria card seen in the Punjab was apparently no longer being used. As in Punjab, severely ill persons or those with fever do go to field health units when the ACD worker was not present. Members of the Union Council in one village and several members of different villages stressed the importance of residual spraying with insecticides as being the most important role of the ACD worker.

4. Passive Case Detection

Only 9.3% of slides are being collected by the PCD system. Despite this, 3.8% are positive which is 10 times that for ACD surveillance. In addition, in 1979 the health services reported 209,089 cases of "malaria fever". If 3.8% were slide positive then there would have been at least 7,945 confirmed cases reported in NWFP and not the 1841 reported cases (no more than half of which were probably reported by the PCD system). As in Punjab, only 10% of the cases diagnosed as malaria at health units, which can be confirmed by slides come to the attention of the MCP. The PCD system can be much better exploited.

5. Smear Reading

Smears appeared adequately stained and properly read, as in other areas. Checking of all positives and 10% of the negative slides was done and 10% of all slides were sent from the district to the provincial level for further checking. The delays in getting slides from the field to the laboratory and results back to the field were about the same in NWFP as in Punjab.

6. Use of Data for Program Planning

Much of the MCP planning is based on the presence of the Afghan refugees in NWFP. Special surveys have been done by the provincial and UNHCR authorities. Since 1979, the number of refugees with malaria

has been increasing, however, the percentage of P. falciparum positive slides has remained low:

Table IX - Malaria in Afghan Refugees

Year	Slides		SPR	% P.falciparum
	Number	Positive		
1979	12,165	233	1.9%	12.4%
1980	52,464	2,562	4.9%	6.6%
1981	177,537	11,254	6.3%	4.7%
1982	295,560	19,042	6.4%	3.5%

Nevertheless, the camps and areas around the camps have been designated as priority areas. Other epidemiologic indices were not routinely used in setting priorities. Age and sex data, mortality data, village by village plotting of cases, use of maps, table and charts and computation of incidence rates were not routinely done.

D. Baluchistan

In 1982, in the Baluchistan Province, the ABER was 1.2%. The region had an overall SPR of 1.5% with P.falciparum comprising 40% of all slide positive cases. This SPR represents an increase from 0.79% in 1980 and 0.85% in 1981. Data was reviewed at the provincial headquarters in Quetta. Copies of a complete Plan of Action for 1983 were provided to the ERT as well as numerous additional maps and tables of epidemiologic and geographic reconnaissance data. District, Sector, and sub-sector review was carried out in the Kalat district.

1. Surveillance

Geographically, Baluchistan consists of a largely unpopulated, arid plateau with an elevation of approximately 5000 ft. The terrain, generally speaking, offers the least favourable conditions for malaria transmission of all the provinces. Given the sparsity of the the population, and the fact that the surveillance units are based on population, the subsector covers vast areas. Transportation, communication and mobilization are relatively important problems in the surveillance operations.

2. Active Case Detection

ACD in Baluchistan generated 29,425 blood slides in 1982. This represented 53% of the total slides collected in the province and an ABER of 0.68%. The SPR rate in slides produced by ACD was 0.8%.

The positivity of slides collected by ACD was about four times less than those collected by PCD. No data was available for age and sex of cases and locality was recorded by sub-sector, not village.

ACD workers in Baluchistan generally cover a population of approximately 12,000. They have no transport and often are expected to cover distances of up to 60 miles per day on foot. Difficulties noted in other provinces with ACD, such as lack of supervision, low wages, and public resentment are also present in Baluchistan. Large numbers of ACD workers are commonly lost to employment offered in the Gulf States.

3. Passive Case Detection

Because of the extreme distances to be covered in Baluchistan, APCD is an important method of surveillance, accounting for 34% of slides collected. For example, in the districts of Chaghi, Zhob and Kohlu, no ACD is conducted and total surveillance is based on APCD and periodic MBS. ABER from PCD for these areas is less than optimal, ranging from 0.2% - 0.8%. SPR for these areas was high, however: Zhob was 9.5% and Chaghi was 12%. Overall, the slide positivity from PCD in Baluchistan was 3.1% and the ABER was 0.43. The falciparum rate from PCD could not be calculated from the data available.

The ERT visited the Hospital in the Kalat division. At this facility, APCD was carried out two weeks out of the months by a malaria supervisor, except during GR and spraying operations. The smears produced by this APCD averaged between 18-30 per month. In March 1983, 113 cases of Clinical Malaria/PUO were seen at the facility. Thus, APCD was successful in obtaining, at best, slides from only 27% of potential cases in the facility. No slides were taken when the APCD worker was away from the hospital, despite the fact that there was a microscope and a full time lab. technician. The technician, when questioned did not know how to make a thick smear. The ERT was told that the only lab. test he performs is the detection of urinary sugar using a Benedict Solution. The hospital stores had no glass slides or lancets available.

The surveillance system in Quetta was another example of poor utilization of major health care facilities for the production of blood smears. The two major Quetta hospitals had 6 full time APCD workers (three of them female). It was claimed that each worker obtained 6-7 slides per day from fever cases. However, the total PCD slides reported by the municipality numbered only 789 for the year, whereas over 7,000 slides would be expected if the six APCD workers had obtained only 4 slides per worker per day.

The Baluchistan MCP made no use of General Health Service statistics for clinical malaria/PUO cases in the province. Requests for such

data by the ERT produced the following information for 1982:

Clinical Malaria/PUO Cases Baluchistan 1982

Total	- 65,038
Male	- 38,291 (59%)
Female	- 26,747 (41%)

No mortality statistics were available. These data suggest that women, while probably less likely to have blood smears taken by an ACD worker, do come to clinics, when they have fever, in nearly the same proportion as men. They therefore, probably receive presumptive treatment at a similar frequency as men. The information provided by such data would tend to refute the contention that the women represent a large unrecognized reservoir for malaria due to cultural practices which prevent their participation in the surveillance system.

4. Special Studies - The Afghan Refugees Problem

The Afghan refugees population numbers more than 700,000 in Baluchistan and is distributed among some 60 camps located primarily in the western part of the province, near the Afghanistan border. In 1981, mass surveys by the MCP were done in some camps which noted a SPR of 6.44%. No further studies have been carried out by the MCP since then, nor does the MCP have any heightened surveillance activity for the Pakistani population located adjacent to the Afghan Camps. More recent information on Malaria, compiled by various relief organizations working in the camps, is probably available. However, there has not been a systematic effort to collect and analyze such data by the Baluchistan MCP.

No special investigations were carried out in 1982 to evaluate possible areas of high malaria prevalence indicated by routine ACD/APCD surveillance. Mass blood surveys accounted for an extremely large proportion of total slides (21.2%) examined in Baluchistan. The SPR was 1.3%, which was greater than that of ACD, but less than the SPR for PCD. The indications for MBS were to classify subsectors by malarigenic potential and was not carried out primarily to obtain epidemiologic information in those subsectors thought to have particularly large number of cases.

5. Smear Collection and Examination

Given the great distances to be traveled in Baluchistan, slide transportation from the field to the laboratory is the greatest problem of the laboratory services. The average time required for such transport is 1 month. Internal laboratory processing time is only 1-2 days, but results returned to the field were again delayed for several weeks. Required time to notification of a positive case is unacceptable. Laboratory supervision, cross checking and stain

quality were quite adequate. Keeping trained personnel for long periods of time was also a major problem.

6. Use of Data for Program Planning

In Baluchistan, the epidemiologic data collected are not used to direct spraying operations. It was the opinion of the Baluchistan MCP that epidemiologic information collected was insufficient to guide such activities. Areas to be sprayed, and other operational decisions, are based on stratification of the subsectors on the basis of malarigenic potential and on political pressures on the MCP to spray certain areas. Malarigenic potential is determined by geographic and meteorologic conditions, vector studies, access, etc. Precise criteria involved in categorizing sub-sectors were not provided, and it is felt by the ERT that the stratification system is a static one, as there appears to be no variability or updating in classifications of subsectors from year to year. The table below, taken from program documents, illustrates the type of operations to be used in the stratified areas:

Table X

<u>Malarigenic Potential</u>	<u>Surveillance</u>	<u>Spraying</u>
Low Potential Feasibility difficult	APCD/Biannual Survey (MBS)	Focal spraying
MED-HIGH Potential Feasibility difficult	ACD APCD Biannual Survey (MBS)	Blanket Indoor spraying
Variable Potential Feasibility good	"Regular Operations"	"Regular Operations"

The ERT selected a sample of subsectors from each of the stratified categories. These subsectors were analyzed by epidemiologic data collected from the regions, and the 1983 spray plan as devised by the Baluchistan MCP. The results are provided in Table XI. A number of important observations can be made from this Table:

1. Blanket indoor spraying is not planned for "Medium to High Potential" subsectors, but is planned for "variable potential" subsectors, despite the Baluchistan MCP operational guidelines described in Table X.
2. The epidemiologic indices for malaria do not correlate with "malarigenic potential" classification.
3. The epidemiologic indices do not correlate logically with proposed plan.

Table XI

1983 SPRAY PLAN FOR SELECTED AREAS OF BALUCHISTAN, WITH CORRESPONDING EPIDEMIOLOGIC VALUES

Stratification Category (Malarionogenic Potential)	Zone	Name	Sub-sector	Pop 1982	1982 ABER (%)	1982 Positive slides	1982 SPR (%)	1982 API 1000	1983 Spray Plan (% coverage)
Potential Low Feasibility Difficult	34	Chagai	a 1-8	67,061	2	46	3.3	0.69	25%
	35	Kharan	a 1-8	85,188	1.5	6	0.5	0.07	12.5%
Potential MED-HIGH Feasibility Difficult	34	Kachi	b 1-5, f	244,350	0.8	5	0.5	0.02	0%
	35	Zasbela	a 1-6	116,379	3.8	6	0.13	0.05	57%
Potential VARIABLE Feasibility GOOD	34	Naseerabad	b 1-8	261,619	2.5	48	0.7	0.18	100%
	35	Quetta	a 1-5	148,648	1.9	133	4.7	0.89	100%

230

V. CHEMOTHERAPY

Chemotherapy is the most important alternative method of malaria control. When used efficiently, it can significantly reduce the reservoir of infection and thereby malaria transmission. To ensure efficiency, 2 basic requirements must be met: 1. The infections must be detected early before the development and maturation of gametocytes (3-5 days for P.vivax, 10-12 days for P.falciparum infections); 2. The infections must be treated appropriately using both a schizontocide and a gametocytocide. Practically speaking, the first requirement is dependent on the presence of an effective surveillance system.

This review will focus on the treatment regimens used with particular attention to the appropriateness of the regimens to meet the needs of a control program and the degree of awareness among the MCP staff on the potential threat posed by the emergence of chloroquine resistant falciparum malaria.

A. Drugs used in the Provinces

1. Types of Antimalarials

The antimalarials available to the various Provincial MCPs, consisting of 13 different preparations, are listed below:

Chloroquine Phosphate (all 150 mg base)

1. Chloroquine Phosphate (Generic from Geofman, Karachi)
- *2. "Delagil" (R) from Hungary
3. "Benaquine" (R) from Yugoslavia
4. Chloroquine Phosphate (Generic) pediatric tab, 80mg base

Chloroquine Sulfate

5. "Nivaquine" (R) 150mg base

Amodiaquine Dihydrochloride (200mg base)

6. "Camoquine" (R)
7. "Basoquine" (R)

Primaquine Phosphate

8. 15 mg base tabs
9. 7.5mg base tabs

Pyrimethamine

10. 25mg tabs

Combination tabs

11. Chloroquine Phosphate 75 mg base+Primaquine 7.5mg base
12. Chloroquine Phosphate 150mg base+Primaquine 15mg base
13. Chloroquine Sulfate 150mg base+Pyrimethamine 15mg base

* Expiration date on can : 3 years after formulation.

The majority of the drugs were procured by the DDMC. The UNICEF, WHO and local procurement provided the balance. Darachlor (Chloroquine + Pyrimethamine) was furnished exclusively by the DDMC.

The current stock of drugs available to the MCP are listed below as a range of the minimal and maximal number of tabs as reported to the ERT.

4-Aminoquinolines (chloroquine and amodiaquine)	3,700,000 - 8,000,000
Primaquine (dose not specified)	547,000 - 3,500,000
Darachlor (Chloroquine + Pyrimethamine)	141,000 - 805,000
Pyrimethamine (available only in MWFP)	Information not available
Chloroquine + Primaquine	Information not available

As indicated, the supply of antimalarial drugs is ample to more than meet the needs of the MCP for the next few years. In fact, the MCP may be overly generous in supplying antimalarials to the DMOs for use in Basic Health Centers. In one Province, 5 million tablets of chloroquine was issued by the MCP to the DMOs to treat on a presumptive basis some 38,000 suspected cases of malaria in 1982. Assuming a maximum of 4 tabs/treatment, this amount of chloroquine is sufficient to treat 1.25 million cases of malaria.

2. Treatment Regimens

Because of the bewildering number of preparations available, instructions for a simple single dose presumptive treatment is made so complicated that not all ERT members agreed on its interpretation. An example taken from instructions issued by one Provincial MCP is reproduced on the following page.

Presumptive Treatment Chart

	<u>16 years & above</u>	<u>7 - 15 years</u>	<u>4 - 6 years</u>	<u>2 - 3 years</u>	<u>6 months to 1 year</u>	<u>3 - 6 months</u>
1. a. Chloroquine	4	3	2	1	1/2	1/4
Nivaquine						
Benaquine						
Amodiaquine (tabs)	+	+	+	+	+	+
b. Primaquine (tabs)*	2	1	1/2	1/4	-	-
2. a. Chloroquine	3	2	2	1	1/2	1/4
Nivaquine						
Benaquine						
Amodiaquine (tabs)	+	+	+	+	+	+
b. Darachlor Tabs	1	1/2	1/4	-	-	-
3. a. Chloroquine	3	2	2	1	1/2	1/4
Nivaquine						
Amodiaquine (tabs)						
UNICEF Tabs.	2	1	1/2	1/4	-	-

(Chloroquine 75 mg + Primaquine 7.5 mg)

Note: 1. Any one of these groups (whichever available) will be selected for presumptive treatment in whole of Districts.

2. This dosage chart will be used throughout the year, irrespective of the areas (under spray or otherwise).

*ERT Note: Since the dose of Primaquine was not provided, the only assumption is a total dose of 15 mg which conforms to regimen 3.

The presumptive and radical treatment regimens used by the various Provincial MCPs are presented in the following tables:

Presumptive Treatment Regimen*

<u>Province</u>	<u>Chloroquine (mg base)</u>	<u>Primaquine (mg base)</u>
Punjab	600 mg	15
Sind	600 mg	0
NWFP	600 mg	30
Baluchistan	600 mg	0

Radical Treatment Regimens*

<u>Province</u>	<u>Chloroquine(mg base) for P. vivax and P. falciparum</u>	<u>Primaquine(mg base) P. vivax</u>	<u>Primaquine(mg base) P. falciparum</u>
Punjab	600mg stat, 300mg at 6 hours, 24 hours and 48 hours	15mg daily x 5 days	15 mg daily x 3 days
Sind	600mg stat, 300mg at 6 hours, 24 hours and 48 hours	15mg daily x 5 days	15 mg daily x 3 days
NWFP	600mg stat, 300mg at 6 hours, 24 hours and 48 hours	15mg daily x 14 days	15 mg daily x 3 days
Baluchistan	600mg stat, 300mg at 6 hours, 24 hours and 48 hours	15mg daily x 5 days	15 mg daily x 3 days

*Adult equivalent dosage

As shown, there is some semblance of uniformity in the regimens used in the various provinces. The notable exception is the use of Primaquine as part of the presumptive treatment and in the radical treatment for vivax malaria.

3. Supervision of Treatment

One of the Provinces has specific instructions for the malaria supervisor to personally administer each dose of the radical treatment. In practice however, the ERT was told that supervised treatment is seldom if even carried out. The standard practice appears to be handing the patient a packet of drugs sufficient for radical cure and requesting the patient to take the initial 10mg/kg dose in the presence of the malaria supervisor. More disturbing perhaps is the difficulty of finding the positive case to administer the radical treatment. Reports from one province indicate that only 35% of the positive cases were located to initiate treatment.

B. The role of Chemotherapy in a control program

There are 2 basic issues confronting the MCP/Pakistan regarding chemotherapy: The first is the appropriateness and timeliness of the regimens used and the second is the need to develop and awareness for the monitoring and containment of chloroquine resistant falciparum malaria. To be effective, the use of chemotherapy as a control measure must incorporate the most upto date information regarding the response of parasites to the various drugs into the formulation of specific treatments. As a general guideline for this purpose, the following principles are presented:

- a. Except in instances where falciparum strains have developed resistance, chloroquine is the drug of choice for affecting a clinical cure of malaria. In fact, available evidence indicates that a single dose at 10 mg base/kg is sufficient to consistently cure acute attacks of vivax as well as falciparum malaria.
- b. Certain falciparum strains which are minimally resistant to chloroquine may be resistant to 10 mg/kg but sensitive to the 25 mg/kg dosage. In practical terms, extensive dependence on the 10 mg/kg dosage may accelerate the selection of incipient resistant strains.
- c. When gametocytes are present in falciparum infections, chloroquine has little or no effect on their viability. In vivax infections however, chloroquine is fully effective against the gametocytes. Thus, a gametocytocidal drug such as a single dose of primaquine of 15-30mg, is required to eliminate falciparum gametocytes.
- d. The standard treatment to eliminate the relapse stage of vivax malaria requires 15 mg primaquine given for at least 14 days. The recommended regimen for use in the field, of 15 mg primaquine daily given for 5 days is still highly controversial. Controlled studies in non-immune subjects in the U.S. showed that the 5 day treatment is totally ineffective in eliminating the relapse stages. Field results from India indicated significant effect while other results from EL Salvador showed only marginal

effectiveness. The effectiveness of the 5 day regimen as used in Pakistan is unknown.

- e. Pyrimethamine, when first evaluated in 1952, proved to be an exceptional antimalarial. Its major drawback however, is the rapidity with which parasites develop resistance to it. When the degree of resistance is sufficiently high, its reknown sporontocidal property is also lost. Available evidence worldwide indicates that the majority of the parasites tested were found resistant. Another well known trait is that when the level of resistance in falciparum strains is sufficiently high, even sulfonamide combinations such as Fansidar, may not be able to over come the primary resistance to pyrimethamine.
- f. The use of single dose treatment of primaquine ranging from 15 to 30 mg in individuals with G-6PD deficiency poses no hazard except in small groups of individuals who carry the rather rare Mediterranean or Canton Variants.

1. Standardization of Drug Procurement

While procurement of different 4-aminoquinolines and even different brands of the same 4-aminoquinolines poses no technical problems, procurement of inappropriate anti-malarials as pyrimethamine and of awkwardly proportioned combinations as chloroquine 75 mg plus primaquine 7.5 mg can cause significant technical and administrative problems. The contra-indications for the continued use of pyrimethamine have already been stated. The use of improperly proportioned drugs such as chloroquine-primaquine complicates greatly the presumptive treatment regimen. To achieve the standard recommendation for presumptive treatment using the chloroquine/combination, the malaria supervisor must be instructed to use 4 c/p tabs (to give 300 mg of chloroquine and 30 mg of primaquine) and add to it 2 additional chloroquine tabs of 150 mg each.

The team noted that some of the antimalarial canisters contain an expiration date as short as 3 years after formulation. This has caused considerable confusion to the MCP and led in some instances to actually discarding the drug. The team is aware that when not opened, antimalarials have a shelf life of many years.

2. Chloroquine Resistant Falciparum Malaria

Taking into account the epidemiology of malaria and the well documented weaknesses in the surveillance system in the MCP/Pakistan, the present strategy in the chemotherapy of malaria must focus on falciparum infections. It was clear to the team that falciparum malaria is a significant problem in much of the Punjab and the Sind. This, coupled with the constant threat of

emergence of chloroquine resistant strains requires that the MCP assign a high priority to its control. As noted earlier, presumptive treatment alone is capable of curing falciparum infections when resistance is not a factor. Unfortunately, experience has shown that chloroquine at a dosage of 10mg/kg when used alone has the potential for selection of resistant strains. To minimize this likelihood, the team strongly urge that every falciparum case detected be treated with chloroquine 25mg/kg over 3 days plus an initial single dose of primaquine 30mg. Since some of the provincial programs already requires a followup smear at the end of the radical treatment, making the followup smear mandatory but postpone its preparation to 5 days after initiation of drug administration would enable the early detection of resistant strains.

The team noted the availability of amodiquine in every province. Since it is no longer formulated and there is evidence that it has a marginal superiority over chloroquine in the treatment of resistant falciparum strains, we suggest that the MCP reserve the remaining stock for such contingent needs. In the meantime, all the treatment needs can be met by the use of chloroquine.

3. Treatment of Vivax Infections

Concerning vivax infections, the team is of the opinion that presumptive treatment alone is curative for the acute attack. Since the 5 day radical cure treatment with primaquine is problematic from the viewpoint of the effort required to find the patient, administer the supervised treatment as well as uncertainty regarding efficacy even if the total treatment can be ensured, we feel that the administration of radical treatment for vivax infections should not be attempted but rather to expend all the effort in administering radical treatment to the detected falciparum cases. Since the response by the vivax parasite to short term primaquine treatment of 5 days or less is unknown, the team suggests that this may be an appropriate high priority problem for investigation by the operational research unit.

C. Drug Sensitivity Testing

The future danger to the MCP/Pakistan lies in the emergence and spreading of chloroquine resistant falciparum malaria. Such strains are spreading through India. The main strategy for the control of such strains relies on the early detection of its presence and on the control of falciparum infections in general. To date, results from numerous in-vivo and some in-vitro testing in Pakistan to detect such strains have generally been reassuring although the NMTC has reported 2 cases of possible RI resistance out of 60 infections assessed in Sheikhpura by the in-vivo method in 1981. Such studies

supplemented by the WHO micro in-vitro method must continue in areas of high falciparum prevalence. Additionally since the response of falciparum strains to pyrimethamine is unknown but resistance suspected, in-vitro tests by the method of Phuc-Dinh is suggested to determine the present status of falciparum strains' response to pyrimethamine. If prevalence of resistant strains as well as the degree of resistance is high, then evaluations must be carried out to assess the susceptibility of these strains to Fansidar by in-vivo means in preparation for the day when this backup drug may be required to treat falciparum malaria resistant to chloroquine.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Surveillance

Surveillance of malaria cases by the Malaria Control Program in Pakistan is based on collection of blood slides from patients with fever. This is done primarily by ACD in villages; however, PCD at health units, APCD and special surveys are also being carried out. As the current objective of the MCP is to control the level of malaria, the importance of the surveillance system must change to meet the rigorous requirements of disease control. The ultimate goal remains eradication, but this will not occur in the near future. Considering these factors and taking into account the Pakistan Government's commitment to develop and integrate malaria control activities into the basic health services, the team makes the following conclusions and recommendations:

Surveillance Conclusions:

1. The present surveillance system, relying mainly on ACD is inefficient administratively and ineffective in detecting most of the acute malaria cases, a vast number of whom appear at health units or go to other health providers for treatment. It is estimated that the incidence of malaria for 1982 may be greater than 1 case per 1000, which is more than twice that reported. Reliable epidemiologic data are not uniformly available to guide program operations.
2. Important epidemiologic information, particularly age/sex distribution of patients, mortality data, and cases occurring at hospitals and other health units is not being collected or used by the MCP in program planning.
3. The Malaria Control Program is not taking full advantage of the developing rural health services infrastructure, either as a case detection, reporting, or treatment resource. The general health services facilities are also remiss in not fully contributing important surveillance assistance (PCD) to the MCP, mistakenly maintaining the attitude that the MCP is still a vertical program. Circulars sent by Provincial Chiefs to health establishments seeking collaboration in case detection activities have received little or no response.
4. Rates and indices, such as the API, the SPR, etc., are not being computed for all administrative levels, especially the village, nor are these indications of disease incidence being used to plan antimalarial vector control or drug intervention measures. Planning

of MCP operations have not sufficiently taken into consideration entomologic data.

5. Criteria are not generally established and written out for how surveillance should be executed, when an "outbreak" of malaria has occurred, when "epidemic" levels have been reached, when there should be an epidemiologic investigation, or what form the investigations and actions should take.
6. Laboratory back-up in most areas of the country appears good; however, many surveillance workers have only one needle for pricking fingers, and the slides are in poor condition or not properly cleaned. The training and materials necessary for slide collection have not been provided to health establishments that could serve as important PCD posts. Time from collection of slide to report back to the field with appropriate action can be greatly shortened.
7. The ACD worker is overburdened with the impossible task of detecting all fever cases, on a monthly basis, without transportation, in a population of twelve to thirty thousand. The situation is aggravated by his other ACD responsibilities; these include GR, APCD, treatment of positive cases and special groups, training and supervision of spraymen, coordination of supplies, and, more recently participation in other programs such as the EPI in Punjab.
8. Dissemination of malaria data, based on the valuable and timely epidemiologic information collected at each level, particularly at the district, should not be limited solely to the Annual Report of the DOMC, but should occur at more frequent intervals.
9. Community participation in malaria control work should be promoted particularly in areas where CHWs are being trained, supervised, and supported by the neighbouring rural health unit.

Surveillance Recommendations:

1. Emphasis should be placed on strengthening the PCD system with the ultimate goal of using this system as the main mechanism for the collection of surveillance data throughout the entire country. The participation of the general health services towards case detection and treatment is of the utmost importance if any progress is to be made towards the control of malaria. This fact has been noted by all previous ERT and general recommendations to remedy such a situation have been made to no avail.
 - a. Directives indicating that MCP activities should occur at all health units should be issued by the highest health authorities at the Federal level to provincial health authorities; necessary follow-up steps should be taken to assure compliance.

- b. Maps and records showing positive cases and percentage of P.falciparum infections should be prepared locality-wise and sub-sector wise.
 - c. Entomologic data to complement clinical and parasitologic findings should be collected.
 - d. Age and sex data.
 - e. Mortality data.
4. Realistic objectives and targets should be established for the level of control desired. These goals should be based on an accurate and complete case detection and reporting system. The ERT suggests:
- a. A national objective of no more than 0.5 cases per 1000 persons per year should be established. To achieve this the immediate aim could be to decrease the actual number of cases occurring by 10% per year until the objective of 0.5 cases per 1000 or less is achieved.
 - b. Provinces, districts, municipalities, and lower units should be responsible for basing their malaria control activities on the local epidemiologic (including entomologic) situation, and to keep their malaria incidence within the nationally defined objectives.
 - c. Geographical/administrative areas should be stratified at least once a year according to epidemiologic (including entomologic) and administrative data.
 - d. Policy decisions should take into account the incidence of presumed malaria cases ("clinical malaria") in the populations considered, and the relative presence of P.falciparum infections. The ABER and API, presence or absence of P.falciparum, and ratio of positive P. falciparum slides, in addition to specially collected data, should be used for planning.
5. A committee should be established by the MCP within one month to review methods of collecting, analyzing and acting on epidemiologic information related to malaria and formulate guidelines within three months. This committee should include representations from the malaria program at national, provincial and district levels, from the general medical services, the NMTC, WHO and USAID. The objective of this group would be the preparation of a manual of operations, which would standardize the approach to surveillance, including the investigation of malaria cases, and the use of epidemiologic data and indices in program planning.

6. An ample quantity of durable reusable lancets should be distributed throughout the country. Each health worker should have at least 20 such lancets and they should be kept in a plastic container that can be sterilized nightly (as was developed for smallpox vaccinations by WHO).
7. Time between slide collection and actual administration of radical treatment to positive cases should be limited to the shortest possible time.
8. A malaria program "feed back" bulletin should be established, giving periodic (quarterly) information on the malaria situation in the nation, provinces, districts etc. The bulletin should be aimed towards the intermediate level field staff (district health officers, rural health center M.O.); and should include brief comments on epidemiologic entomologic and chemotherapeutic issues and developments of particular concern to these personnel.
9. Community participation in malaria surveillance should be encouraged. CHWs in at least one district in each province, particularly in those areas distant from a health unit, should be provided with the proper support for doing malaria surveillance and treatment.
10. Coordination and cooperation should be strengthened between agencies concerned with health in refugee camps and malaria personnel at Federal and Provincial levels. Laboratory facilities for slide diagnosis within refugee areas should be improved.
11. Certificates or other awards should be given to workers doing especially meritorious malaria surveillance or making other significant contributions to the program.

B. Chemotherapy

The aims of chemotherapy are: (1) to cure the patients who have clinical malaria or who have fever presumed due to malaria; (2) to reduce malaria transmission by eliminating gametocytes (the form of the parasite infective for anopheline mosquitoes) in the blood of patients; (3) to prevent relapse due to P. vivax in areas where reinfection by the same species is not expected. In forming the following conclusions and recommendations the ERT-83 has taken into account the fact that the objective of the MCP in Pakistan is control, not eradication and that prevention of transmission by drug use is only an adjunct to more effective vector control methods.

Conclusion -1: Chloroquine is the drug of choice for treating malaria in Pakistan.

Conclusion - 2: A variety of treatment schedules are used in different parts of the country, both for presumptive and radical therapy; this has created confusion and imprecision in assuring that patients are properly treated.

Conclusion - 3: Many different anti-malaria drugs are being used, causing confusion for malaria and other peripheral health workers on how to treat patients properly.

Conclusion - 4: Drugs containing pyrimethamine alone (Daraprim) or in combination with chloroquine (Darachlor) or sulfonamides (Fansidar, Metakalfin) are being used to treat malaria instead of chloroquine; the sulfa containing drugs are being used especially by practitioners. The use of these drugs is inappropriate because resistance to pyrimethamine develops rapidly and may extend to drugs that may be required in the future, such as Fansidar.

Conclusion - 5: The ERT concurs with WHO recommendation, 1981 that it is doubtful if radical treatment of P. vivax malaria, being the prevalent species in the country, is necessary if the patient lives in an endemic area where transmission of the infection continues and reinfection is likely.

Conclusion - 6: In some areas mass drug administration is being given to school children and persons who had malaria the year previously without epidemiological justification.

Conclusion - 7: There is no evidence of chloroquine resistance of P. falciparum strains in Pakistan, except in one district in the Punjab where 2 cases of suspected RI resistance were observed in 60 cases tested.

Conclusion - 8: Antimalarial drugs, particularly chloroquine and other 4-aminoquinolines are very stable and most of these retain potency and safety beyond the expiration date stamped on the package. In view of the above, the team recommends the following:

Recommendation 1: Only chloroquine should be distributed by the MCP for the treatment of acute malaria.

Recommendation 2: Treatment schedules should be standardized.

- a. Presumptive treatment for malaria should include chloroquine 10 mg base/kg plus primaquine 0.5 mg base/kg given as a single oral dose.
- b. Radical treatment for P. falciparum infections should include Chloroquine 25 mg base/kg over 3 days plus a single dose of primaquine at a dose of 0.5 mg base/kg.
- c. Radical treatment for P. vivax as a public health measure should be discontinued, except in areas where the surveillance system is adequate to detect at least 75% of cases, the API is less than 0.1 per 1000.

Recommendation 3: Drugs containing pyrimethamine should not be procured from any source or distributed as an antimalarial.

Recommendation 4: The prophylactic use of antimalarials in endemic areas is controversial because the methods used to provide mass treatment at periodic intervals to groups at special risk also is conducive to the selection of drug resistant malaria. The ERT therefore, suggests that guidelines for the selection of groups and the indication for its use be formulated by the committee to be formed as part of the surveillance recommendation.

Recommendation 5: Mass drug administration (MDA) should be used only for those situations advised by WHO Expert Committee i.e. (persistence of small foci after transmission is interrupted elsewhere; for a focal out-break; and where people congregate from different areas increasing risk of disease spread).

Recommendation 6: Printed instructions for use of antimalarials should be with each ACD and PCD worker as well as posted in all health units of the country.

Recommendation 7: In-vivo and in-vitro sensitivity testing of P.falciparum strains should be performed in Sheikhpura District of the Punjab and in other epidemiologically important areas; this should be done in accordance with WHO protocols and with the collaboration of the NMTC, WHO, and USAID. A special plan for periodic testing of other standard antimalarial drugs should be established.

Recommendation 8: Antimalaria drugs which have expired, particularly chloroquine, should not be discarded until potency checks are made by independent laboratories or by WHO collaborating centers.

C. Issues Related to Surveillance and Chemotherapy

Conclusions:

1. The team regrets the delay encountered to secure sanction for the creation of the Operational Research Unit. We can not over-emphasize the vital role an operational research unit can play in helping to solve the many technical problems presently confronting the MCP.

2. Training at all level needs to be reviewed. Emphasis should continue to be on integrating malaria control into the daily work of the basic health services.

3. The importance of urban malaria within the country needs to be better defined. Surveillance for malaria needs to be improved greatly in urban centers. The existing health infrastructure in municipal corporations appears adequate to help define the malaria problem providing there is a willingness to do it.

4. Many influential administrative and health service personnel do not think malaria an important public health problem in Pakistan. As a result there has been little health education material developed recently on malaria to promote the control program activities.

Recommendations:

1. A program of operational research needs to be carefully developed budgeted and executed. A coordinating committee composed of representatives from the DOMC, NMTC, WHO, USAID, ICMRT, NIH and other components should be formed to guide the operational research activities. The following suggested activities deserve priority attention:

- a. Redefining the role of the malaria supervisor in order to improve his efficient utilization for malaria surveillance.
- b. Explore methods to make PCD posts productive.
- c. Evaluate the effectiveness of short-term primaquine treatment, 3-5 days, as a radical cure for P. vivax infections.
- d. Monitor the emergence of chloroquine resistant falciparum malaria by the use of in-vivo tests supplemented by the WHO micro in-vitro test.
- e. Establish base-line sensitivities of falciparum parasites to other antimalarials.
- f. Evaluate the accuracy of the clinically diagnosed malaria cases.

2. The NMTC needs to be strengthened in personnel, funding and physical facilities. Courses should continue to address integration of select aspects of malaria control into basic health services.

3. Urban Malaria: The external review team notes with satisfaction that the basis for urban malaria control have been established in the major urban centers of the country. Anti-vectorial activities, with marginal degree of efficiency and planned without the support of epidemiologic data, particularly parasitologic data, are being implemented by the responsible city bodies under the technical guidance of the malaria personnel. However, without the collection of epidemiologic data and the establishment of an efficient inter-sectoral cooperation, the measures applied will be inadequate and will attain only palliative results. With a view to the above the following is recommended:

- a. The establishment of a Urban Malaria Board, as recommended by previous external teams, at least in the major cities of the country.

All city bodies concerned with the creation of man-made breeding places, the abatement of nuisance insects, particularly mosquitoes, should meet yearly and formulate a joint anti-mosquito plan, which would include anopheline, and pool all resources together for this purpose.

Instructions for the establishment of such a Board should come from the highest authorities at Federal level and should involve at the Provincial level the Secretary of Health and the Commissioner. The chairmanship of such a Board should be given to a highly located Provincial authority, while a team of senior officers should be responsible for the supervision of coordinated inter-sectoral activities.

- b. Passive case detection should be enforced and properly organized in all urban health establishments. A few strategically situated health establishments within each urban and peri-urban area should be selected for the purpose of monitoring with accuracy the occurrences of indigenous malaria in urban and peri-urban areas.
- c. Longitudinal parasitologic surveys of sections of the urban/peri-urban population should be organized on yearly basis. Assistance, if required, should be provided by the Provincial MCP.

4. A large scale health education campaign focusing on malaria should be coordinated at the national, provincial and district levels to take advantage of health education programs already existing in other government agencies.

VII. ACKNOWLEDGEMENTS

We wish to convey our thanks to the Malarial Control Program personnel in each of the Provinces visited for their excellent cooperation, generous hospitality and courtesy extended to the team members. For an evaluation of this type we had to gather the maximum amount of information in the shortest possible time. To do this, our questioning and probing may have appeared quite direct and overbearing at times, but our intent was only to gather as clear and accurate picture of the current situation as possible and not to create undue anxiety. Everywhere we went we found dedicated field workers and this spirit, we sensed, went into the preparation of the ERT-83 visits.

To the staff of the Directorate of Malaria Control (DOMC) WHO and USAID, we express our appreciation for finalizing the arrangements which made it possible for the team to perform the evaluation and to complete the report in the short time available. Mr. Yawar and Mr. Altaf and Mr. Aslam did a fine job in typing the many drafts of this report.

We dedicate this report to the Malaria Supervisors and other program field staff, many of whom have steadfastly kept to their task for over 2 decades. Without their willingness to work under very difficult conditions this evaluation could not have been carried out because there would be no Malaria Control Program to assess.

VIII. REFERENCES

1. Project Paper Malaria Control II Project (No. 391-0472) 1982-88, dated April, 1982.
2. PC-I - Malaria Control Project 1982/83 - 1985/86 prepared by Directorate of Malaria Control (DOMC), Ministry of Health (MOH), Government of Pakistan (GOP).
3. Plan of operation - Malaria Control Program - GOP 1980/81 to 1978/88 dated December, 1979.
4. Annual Report 1980-81, DOMC, MOH, GOP.
5. Annual Report 1979-80, DOMC, MOH, GOP.
6. Housing and Population Census of Pakistan 1980-81 : By Census Organization, GOP.
7. Terminal Evaluation Report 1981 - Malaria Control Project No.(391-0424) 1975-81, dated January 29, 1981.
8. External Review Report 1979 - Malaria Control Project (391-0424) 1975-81
9. External Review Report 1978 - Malaria Control Project (391-0424) 1975-81
10. External Review Report 1977 - Malaria Control Project (391-0424) 1975-81
11. Evaluation Manual - West Pakistan Malaria Eradication Program, 1968
12. Project Proposal: Can epidemics be Averted? by DOMC, MOH, GOP.
13. Guidelines for Planning Malaria/Mosquito Control in Urban environments by Dr. L. Boschi WHO/EMRO, 1983
14. Training and Research Activities - National Malaria Training Center (NMTTC) Lahore - Report dated April 26, 1983.
15. Outline of Curriculum Training Program NMTTC dated April, 1983.
16. Pakistan Refugees - Principles of Control of Malaria written by Dr. L. Boschi, WHO Malaria Advisor.

17. Afghan Refugees Health Program Report April, 1983
18. Chemotherapy of Malaria - WHO Publication, 1981.
19. Studies of Chloroquine Sensitivity of P.falciparum in Pakistan in 1974-81 - DOMC, MOH, GOP.
20. Studies on Chloroquine Sensitivity of P.falciparum in Sheikhpura District October-November, 1981, NMTC.
21. Health Education Material - Malaria Control Program Punjab
22. Statistics of Hospitals and Dispensaries in Punjab, 1980 Report, by Health Directorate, Punjab.
23. Surveillance Activities - Communicable Diseases Control (CDC) Punjab 1980-81.
24. Plan of Spray 1983 by Deputy Director (CDC), Punjab.
25. Urban Malaria Activities, NWFP Report dated April 1983
26. Malaria Control Activities Report, NWFP 1976-81
27. Malaria Survey in Northern Areas.
28. Plan of Action 1981-82 and Annual Report 1980, NWFP.
29. Malaria Control Activities:
 - Peshawar Zone Report April 1983
 - Swat Zone Report April 1983
 - Kohat Zone Report April 1983
 - Mardan Zone Report April 1983
 - Dadu Zone Report April 1983
 - Sheikhupura Zone Report April 1983
 - Gujrat Zone Report April 1983
30. Trip Report May 27-June 3, 1982 by Dr. James W. Miles, CDC Atlanta, Georgia.
31. Trip Report September 14-October 3, 1982 by Dr. William Chin, Malariaologist Consultant.

DATA COLLECTION SHEET

Province _____
 District _____
 Sector _____
 Sub-sector _____
 Locality _____
 Other _____

MALARIA EXTERNAL REVIEW SURVEILLANCE

I. DATA

A. - 1982 Data by month

1. Slides collected by source:

ACD _____ PCD _____ Mass Survey _____

2. Slides positive

a. By source ACD _____ PCD _____

b. By species _____

d. Mass Survey _____

e. By age and sex _____

f. By location _____

B. - Malaria and Fever cases (if available) from units that report (by month or by year)

1. By unit -

a. Hospitals (include total visits for all causes)

b. MCHcare center -do-

c. Rural Health Center -do-

d. Dispensaries -do-

2. By age, sex and location

C. - Mortality data by cause, age and sex and locality

II. METHOD OF DATA COLLECTION

A. - Review of instructions on method of data collection (received and given)

B. - Deadlines

C. - Number of reports expected and number of reports received for 1982.

D. - Criteria for visits/village, taking slide and giving treatment.

III. METHOD OF ANALYSIS

A. - How do people think data are used:

1. strategy and tactics

2. treatment

B. - How data are used in making reports

C. - Individual summary form:

1. obtain copy

2. totals

3. rates computed

4. maps made

5. delay in time in sending to next level up

D. - Feedback of analysis to higher and lower levels

IV. LABORATORY

A. - Slides

1. Condition:

a. Type sent in thick or thin

b. Stain used, problems

2. Turnaround time
 - a. Time from smear to reaching lab
 - b. Internal processing time
3. Do they know criteria for slides being sent to them (reference)

B. - REVIEW

1. Adequacy of stains
2. Review of slide positive or negative

C. - TRAINING AND SUPERVISION

1. What % (+) are read by supervisor
2. What % (-) are read by supervisor
3. Turnover of personnel
4. Training
5. Average output of a single microscopist.

V. SUPERVISION

A. - Supervisory role

1. Who reports to you
2. How often
3. Deadlines
4. Frequency of your visits to the field
5. Date of last 2 visits to field
6. Tasks as a supervisor:
 - a. training
 - b. provision of drugs
 - c. health education
 - d. liaison with local officials

B. - Reporting Roles

1. To whom do you report
2. How often
3. Deadlines
4. Frequency of visits to you by supervisor
5. Date of last 2 visits to you
6. Have you received from your supervisor :
 - a. training
 - b. drugs

VI. Action taken based on surveillance

A. - Are there criteria (indications) for deciding when the following has occurred:

1. Increase number of slides
2. Increase in P.falciparum
3. Increase in fever cases
4. Increase in mortality from fever, malaria (or other disease)
5. Fever/malaria not responding to drugs.

B. - Are there criteria for deciding when actions are taken if any of above has occurred (who makes the decision and how long does it take?)

C. - What are criteria for antivector measures (insecticide/larvacide, etc used)

1. Type and formulation
2. Amount/M²
3. Place
4. Frequency
5. Other (source reduction)
6. Comment on protection of spraymen (clothing, cholinesterase level measures, etc)

7. Are there criteria for mass drug therapy/

VII. Utilization of services

- a. How do you estimate utilization of services**
- b. Estimated % of population that lives within 5 kilometers of health service/surveillance unit**
- c. Estimate % of population that has utilized any health service in the past year**
- d. Estimated % of newborns delivered at home**
- e. Interview in village by external review team:**
 - 1. People with fever/malaria cases within past year**
 - 2. How many visits by ACD health worker in last year**
 - 3. Where did you go for diagnosis and treatment if you had fever within the last year:**
 - a. how long did you wait before going for treatment**
 - b. did you have a blood slide taken**
 - c. did you take malaria pills**

VIII. REMARKS

Population of location _____

Malaria External Review
Slides collected and positive
for 1982

Province, District, Sector,
Sub-sector, locality (circle)

Name _____

Month	ACD				PCD				TOTAL					
	Total	No.+/%+	P.v.	P.f.	%P.f.	Total	No.+/%+	P.v.	P.f.	%P.f.	Total	No.+/%+	Pv.	Pf.
January														
February														
March														
April														
May														
June														
July														
August														
September														
October														
November														
December														

Total*

*Compute ABER (annual blood examination rate) and %+ slides for the total

1/1

CHEMOTHERAPY

Area Visited:

Province _____

District _____

Sector _____

Sub-sector _____

Locality _____

Other (hospital,
pharmacy, etc) _____

Antimalarial Procurement 1982:

	Content:	No. Tabs:	Source:	No. tabs used:
Drug:				
1.	1. _____	1. _____	1. _____	1. _____
2.	2. _____	2. _____	2. _____	2. _____
3.	3. _____	3. _____	3. _____	3. _____
4.	4. _____	4. _____	4. _____	4. _____

III. Current stock:

1. _____
2. _____
3. _____
4. _____

IV. *Presumptive treatment regiven: _____
_____ **No. treatment given 1982** _____

V. *Radical treatment regiven: _____
_____ **No. treatment given 1982** _____

VI. *Mass drug administration:

Drugs used:

Amount:

Indication:

Frequency:

VII. Adverse reactions reported and other observation:

VIII. Resistance:

1. Have there been any patients with malaria who have had resistance to the drugs used:

Yes

No

2. If yes, which drug _____

3. Describe basis on which resistance confirmed _____

***Attach copy of written protocol or instruction used in area.**

PLACES VISITED/PERSONS CONTACTEDNWFPPeshawar

Dr. Mohammad Iqbal	Chief, Provincial Malaria Control Program
Mr. A. Aziz Khan	Senior Malaria Supdt Provincial Office
Mr. Fazale Raziq	Entomologist Provincial Office
Mr. Shaukat Pervez	Assistant Entomologist Provincial Office
Mr. Mohammad Iqbal Khan	Administrative Officer Provincial Office

Provincial Health Department

Dr. Abdul Khaliq	Secretary Health
Dr. Mohammad Aurangzeb	Director Health Services
Dr. Mohammad Ayyaz	Incharge E.P.I. Program NWFP
Dr. Ali Sher	Project Director Health Services, Afghan Refugees

Afghan Refugee Organization

Mr. Abdullah	Commissioner Afghan Refugees NWFP
Dr. Ali Sher	Project Director Afghan Refugees Health Services
Dr. Lewi-Roque	Incharge Malaria and other Preventive Health Activities

Peshawar Malaria Zonal Office

Mr. Murtaza Khan	District Malaria Control Officer
Mr. Abdul Raheem	Entomologist
Mr. Ali Nasir	Entomologist
Mr. Kebab	Malaria Superintendent
Mr. Abdul Ghafoor	Assistant Malaria Supdt.
Mr. Zareen Gul	Malaria Supervisor

Khyber Teaching & Lady Reading Hospitals

Prof. (Dr.) Ashfaq Ahmad Paediatrician
Prof. (Dr.) Imran Paediatrician

Mardan Zone

Dr. Said Qureshi District Malaria Control Office
Mr. Ajmal Khan Admin Officer
Mr. Waheed-ur-Rehman Entomological Assistant
Mr. Mohammad Jamil Malaria Superintendent

Jalala Refugee Camp

Dr. Abdul Qadeem Medical Officer
Dr. Said Yousaf MD Student final year i/c Jalala Health Services
Miss Hafeeza Lady Health Visitor

Swat Zone

Dr. Hidayatullah Khan District Malaria Control Officer
Mr. Yaqub Khan Administrative Officer
Mr. Rahim Khan Malaria Superintendent
Mr. Mohammad Ali Khan Entomological Assistant
Mr. Shafiqur Rehman, Khan Assistant Malaria Superintendent

Dispensary Odigram

Saij Ram Dispensary Incharge
Mr. Jallandar Khan Malaria Supervisor

Civil Hospital Bari-Kot

Dr. Shebbar Mian Medical Officer
Mr. Raham Badshah Malaria Supervisor

Village Aboha

Mr. Mohammad Ayyab Malaria Supervisor Aboha

Chakdara Refugee Camp (Dir)

Dr. Ahmed Sher Zamani Medical Officer

Mr. Fazal Wahab Malaria Supervisor

Mr. Mohammad Hussain Assistant Malaria Superintendent

Sub Zone (Dir)

Mr. Abdul Rahim Khan Incharge Admin Office

PUNJAB

Provincial Chief, Malaria Office

Dr. S. M. Nasir PCO - Assistant Director CDC

Mr. Matinul Haq Khan WHO Operational Assistant

Mr. Sana A.K. Mahmood CDC Officer

Mr. Makhtar Ahmad Parasitologist

Mr. Javed Iqbal Malik Assistant Entomologist

Mr. Hassano Putro Provincial Coordinator, UNICEF

Director Health Services

Dr. Elahi Bux Soomro Director Health Services

Dr. Sarfraz Qutab Deputy Director CDC

Mr. Munawer Qureshi Statistical Officer

Mr. A. Chohan Statistical Officer

Secretary Health Office

Brigadier Manzur A. Malik Secretary Health Punjab

Mayor of Lahore Office (Corporation)

Haji Shuja-ur-Rehman	Mayor
Dr. Mohammad Haneef	Chief Medical Officer
Dr. Asadur Rehman	Epedemic Control Officer
Mr. Muneer Ahmed	City Councillor
Haji Sheikh Rashid	City Councillor

D.H.O. Office, Sheikhpura

Dr. Aftab Ahmad Chaudry	DHO (DMCO) Sheikhpura
Mohammad Yaseen Butt	Administrative Officer (Malaria)
Mr. Mohammad Azam	CDC Officer
Mr. Naseer Ahmed Sheikh	Assistant Entomologist

Kharryan Wala Town

Mr. Muhammad Hussain	Malaria Supervisor
Mr. Sultan Ahmed	Secretary Union Council
Mr. Anwer Khan	Chairman Union Council

Feroz Watwan, Basic Health Unit

Mr. Shakoor Rana	Male Medical Technician
Miss Tanwir Akhtar	Female Medical Technician

Gujrat District

Dr. Nisar Ahmed Bajwa	DHO Gujrat
Syed Asghar Ali Shah	Administrative Officer (Malaria)
Mr. Aminullah Amin	CDC Officer
Dr. Abdul Rashid	Medical Superintendent DHQ Hospital, Gujrat

Civil Hospital Jalal Pur Jattan

Dr. Mohammad Iqbal Medical Officer Incharge Civil Hospital
Mr. Mehboob Alam Dispenser

Village Bilawal District/Tehsil Gujrat

Mr. Ghulam Hussain Malaria Supervisor
Mr. Mohammad Afzal Headmaster Primary School
Mr. Mohammad Inayat Teacher Primary School
30 minor boys & girls Students primary school

Basic Health Unit, Sheikh Chogani

Dr. Arshad Mahmud Hariach Medical Assistant Incharge
Miss Mubassara Butt Lady Health Visitor

Pakistan Medical Research Council (PMRC)

Brig. Manzur A. Chaudhry Associate Director
Dr. Richard Sakai Acting Director

Lahore Corporation

Dr. Mohammad Hanif Chief Medical Officer
Dr. Asadur Rahman Epidemiologic Officer
Mr. Mohammad Sharif Inspector Malaria Lahore Corporation

Place visited in Lahore City

Sanda Locality

Bund Road

BALUCHISTAN

Quetta

Dr. Naimatullah Gichki Provincial Chief
Mr. Abdul Sattar Senior Malaria Superintendent
Mr. Samad Ali Administrative Officer
Mr. Mohammed Hashim Khan Transport Officer
Mr. Ali Ahmed Assistant Entomologist
Mr. Abdul Salik Khan Non-Medical Evaluator
Mr. Noorullah Khan Health Education Officer

Civil Hospital, Mustung

Dr. M. Jafar Khansi Medical Officer Incharge

Visit to locality Mohd. Elial (a-5-05), Tehsil Mustung, District Kalat

Afghan Refugee Organization

Dr. Zahur-ul-Haq Medical Director, Afghan Refugees, Baluchistan

Quetta Municipal Corporation

Dr. Sajad Ahmed City Health Officer, Quetta

SIND

Hyderabad

Dr. Y. M. Ansari Provincial Chief, Malaria Program
Dr. A. R. Sumroo Health Secretariat, Karachi
Mr. Murad Memon Senior Malaria Superintendent

Rural Health Center, Seven Sharif (K-1), Dadu District

Dr. Ghulam Qudir Qureshi Medical Officer Incharge

Rural Health Center, Bhan Syed Ahad (J-4), Dadu District

Dr. Ahmed Bux Medical Officer Incharge

District Health Office, Dadu

Dr. Mustafa Khuhawan DHO Dadu

Mr Abdul Ghani Malaria Superintendent

Mr. Aziz Ahmed Non-Medical Evaluator

District Health Office, Thatta

Dr. Jhaman Das DHO, Thatta

Mr. G.N. Shamsher Malaria Superintendent

Mr. M. Ishaq Non-Medical Evaluator

Karachi Municipal Corporation

Mr. H. A. Naqvi Malaria Superintendent

District Health Office, Karachi

Dr. Din Mohammad DHO Karachi

Mr. Mahmud-ul-Haq Assistant Entomologist

Mr. Majid Ali Khan Senior Malaria Superintendent

USAID

- Dr. Donor M. Lion - Mission Director, USAID/Pakistan
- Mr. Jimmie Stone - Deputy Director, USAID/Pakistan
- Dr. Cornelia E. Davis - Chief, Office of Health Population and Nutrition (HPN) USAID/Pakistan
- Mr. John Blackton - Chief, Office of Program, USAID/Pakistan
- Mr. Shahabuddin Khan - Program Specialist, Office of Project Development and Monitoring (PDM), USAID/Pakistan

DMC

- Dr. S. M. Muftaba - Director, Directorate of Malaria Control

Ministry of Health

- Dr. Nasir uddin Jogezai - Minister for Health and Social Welfare Government of Pakistan
- Maj Gen. I. A. Burney - Executive Director, National Institute of Health

WHO

- Dr. Iqbal Mohammad Chaudhri - National WHO Representative and Program Co-ordinator

**Summary of Malaria Surveillance in
Pakistan - 1982**

Province	Total slides	% ACD	% PCD	% other	Positive slides	ABER %	API/1000	SPR	Falcip rate
Punjab	1,630,244	94	6	-	21,888	3.4	.46	1.34	0.31
Sind	525,772	69	20	11	7,219	2.8	.38	1.37	0.47
NWFP	603,602	86	9	5	4,437	5.5	.44	0.73	0.02
Baluchistan	55,392	53	26	21	888	1.3	.19	1.52	0.67
Total	2,815,010	87	10	3	34,432	3.3	.41	1.2	.28

**ACD AND PCD* IN PAKISTAN : PROPORTION OF SUPERVISORS
AND EFFICIENCY IN MALARIA DETECTION**

Province	ACD		PCD		SPR		PCD+/ ACD+
	#	% of total collected	#	% of total collected	ACD	PCD	
Punjab	1,537,223	94	93,019	6	1.2	3.9	3.2
Sind	365,047	69	103,633	20	0.9	2.5	2.6
MFP	520,301	86	56,150	9	0.4	3.26	8.6
Baluchistan	29,425	53	14,232	26	0.8	3.1	3.9
Total	2,452,006	87	267,034	10	1.0	3.2	3.2

*PCD is activated

**EPIDEMIOLOGIC INFORMATION FOR SUBSECTORS
IN SECTOR-J DADU DISTRICT SIND 1981+1982**

Sector J	1982 POP	1981-2									1982-3								
		Total Slides	ABER %	API/ 1000	V	F	T	SPR %	FALCP RATE%	SPRAY PLAN	Total Slides	ABER %	API/ 1000	V	F	T	SPR %	FALCP Rate %	SPRAY PLAN
1	18261	1008	5.5	0.2	4	1	5	0.5	.09	-	1382	7.5	1.3	22	1	23	1.7	.07	F
2	18239	800	4.4	1.2	20	2	22	2.8	.25	M	1169	6.4	1.4	19	8	27	2.3	.6	F
3	15632	522	3.3	0.8	11	2	13	2.5	.38	M	898	5.7	0.7	10	1	11	1.2	.1	-
4	11233	1065	9.5	1.5	13	4	17	1.6	.37	M	1084	9.6	0.8	8	2	10	0.9	.2	-
5	11283	444	3.9	0.6	7	0	7	1.6	0	-	452	4.0	0.9	10	1	11	2.4	.2	-
6	13003	1146	8.8	3.1	41	1	42	3.7	.09	M	1247	9.5	1.8	14	9	23	1.8	.7	-
7	13682	1308	9.6	1.8	23	2	25	1.9	.15	M	1955	14.0	2.8	35	4	39	2.0	.2	F
8	11970	894	7.4	1.2	12	2	14	1.6	.22	-	873	7.2	1.5	16	2	18	2.1	.2	F
9	14571	935	6.4	0.5	7	1	8	0.9	.11	-	929	6.7	0.1	1	1	2	0.2	.1	-
Totals	127874	8122	6.3	1.2	138	15	153	1.9	.18		9989	7.8	1.3	135	29	164	1.6	.29	

M=Malathion

F=Fenitrothion

ITINERARY ERT (PART I), 1983

- April 15 : Arrival of expatriate team members.
- April 16 : Orientation and meeting at DONC, WHO.
- April 17 : Briefing by USAID, introduction of team members to Dr. Mohsin Pal, DG/Health Services. Designation of members to Team A and Team B.
- April 18 : Departure of Team A to NMFP. Departure of Team B to Baluchistan.
- April 19
to
April 21 : Field work by the teams in their assigned provinces.
- April 22 : Departure of Team A from NMFP to the Punjab. Departure of Team B from Baluchistan to the Sind.
- April 23
to
April 25 : Field work by the teams in their assigned provinces.
- April 26 : Both teams return to Islamabad (Dr. Delfini proceeded from Karachi to Lahore and returned to Islamabad on April 27).
- April 27
to
May 1 : Preparation of report.
- May 2 : Presentation of first draft to USAID, Seminar on surveillance and chemotherapy.
- May 3 : Presentation of report to Ministry of Health.