



WHO INTER-REGIONAL TECHNICAL MEETING ON MALARIA ERADICATION
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PROGRESS REPORT ON MALARIA ERADICATION
PROGRAMME II PAKISTAN

By

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I. BACKGROUND

Pre-eradication survey of the country commenced in October, 1959 by two teams of WHO experts and was concluded in September, 1960. A Plan of Action was drawn up based on this Pre-eradication Survey and Government of Pakistan signed an agreement with WHO to implement this Plan of Action. Detailed Plans of Operations have been drawn up for East and West Pakistan and necessary legislative and administrative set-up has been created to implement these Plans.

II. PLAN OF ACTION

Malaria Eradication will be carried out by means of a phased programme extending over a period of fourteen years. The cost of the project is estimated to be Rs.520 million, out of which Rs.193 million are external expenditure. (An abstract of Plan of Action is attached as Annex I.)

III. LEGISLATION

Government of Pakistan has enacted legislation to create an autonomous body viz. Malaria Eradication Board to implement this Scheme. The Board is presided over by the Minister of Health and is composed of the following members:-

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|--------------------------------------------------------------------------------------|-----------|
| 1. Minister for Health, Government of Pakistan | Chairman |
| 2. Secretary to the Government of Pakistan
Ministry of Finance (Expenditure) | |
| 3. Director General, Health, Government of Pakistan | |
| 4. Director General, Medical Services of the Armed
Forces, Government of Pakistan | |
| 5. Director, Health Services, East Pakistan | |
| 6. Director, Health Services, West Pakistan | |
| 7. Director, Bureau of National Reconstruction,
Government of Pakistan | |
| 8. Col. M.K. Afridi | |
| 9. Director Malaria Eradication Programme | Secretary |

Two subsidiary Provincial Boards have been created to execute the Scheme in the Provinces with the following composition:-

- | | |
|------------------------------------------------------------------------------------|-----------|
| 1. Director of Health Services of the Province | Chairman |
| 2. One Officer to represent the Finance
Department of the Provincial Government | |
| 3. One Officer to represent the Home
Department of the Provincial Government | |
| 4. Director Malaria Eradication Programme | |
| 5. Provincial Chief, Malaria Eradication Programme | Secretary |

The Board has financial autonomy. All personnel working in the project are employees of the Board and are governed by rules and regulations framed by the Board. The Board has delegated powers for implementing the Scheme to the Director Malaria Eradication Programme and direct chain of command exists from the Director to the lowest echelon in the administrative set-up without intervention of other government offices. A non-lapsable Malaria Eradication Fund has been created in which contributions from the Central and Provincial Governments are received. The funds are expended according to the rules framed by the Board. The legislation also provides powers for enforcement of Malaria Eradication measures such as medical examinations, spraying of houses, prohibition of washing, white-washing, plastering of sprayed surface and powers of entry into the premises by Malaria Eradication personnel. This legislation forms the basis

for creation of an efficient administrative set-up which has the necessary powers for implementing the Scheme. (A copy of the legislation is at Annex II).

IV. ADMINISTRATIVE SET-UP

The Directorate of National Malaria Eradication Programme has been established and is located at Karachi. Its main Sections will be:-

- i) Finance and Accounts
- ii) Supply
- iii) Personnel
- iv) Public Relations
- v) Statistics

Some of these Sections are already functioning and others are being organized at present.

Each of the two Provinces has a Provincial Headquarters headed by the Provincial Chief of Malaria Eradication. In these Headquarters also the administrative set-up consists of Supply, Accounts and Personnel Sections and the technical set-up consists of Operations Section, which deals with field operations and an Evaluation Section consisting of Epidemiological and Laboratory staff. In Headquarters of lower echelons also, personnel are divided into Administration, Operations and Evaluation Sections.

Provincial Headquarters with nucleus of all these Sections have been established and as the Scheme expands, sufficient staff to man these Sections will be provided. Under the Provincial Headquarters at present, two Zone Headquarters are functioning in each of the two Provinces and four more Zone Headquarters will be opened during the current year in each of the Provinces. Two Regional Headquarters are proposed to be established when the new Zones come into being.

V. TRAINING CENTRES

The Government of Pakistan has signed an agreement with WHO to establish two Training Centres. These Training Centres have been established in the Institute of Hygiene and Preventive Medicine Lahore and Malaria Institute of Pakistan Dacca. The staff of these Institutes work as National counterparts of the WHO experts in imparting training in accordance with the WHO syllabi and standards.

These Training Centres are functioning and have conducted following courses:-

1. Two Junior Courses one each at Lahore and Dacca.
2. Three Courses for Microscopists, two at Lahore and one at Dacca.
3. One Senior Course at Peshawar.

WHO has also made available, fellowships for training abroad for senior personnel employed in the Programme, and last year, eleven senior personnel were sent abroad on these fellowships.

VI. OPERATIONS

West Pakistan

During 1961 Operations were conducted to cover 1,067,000 population in Sheikhpura District of West Pakistan. These Operations were conducted without adequate period of Preparatory Phase due to delay in launching the Scheme.

In March, 1961 the Zone Headquarters of Sheikhpura District were opened and following Operational staff was provided:-

Chief of Operations	1
Sanitarians	2
Sector Chiefs	10
Assistant Sector Chiefs	10
Squad Leaders	80
Pump Repairers	10

These personnel were given training in the field as the time for regular courses was not available. Block-mapping of the localities was done without numbering of houses. Necessary administrative personnel and evaluation staff with an Evaluator and ten Microscopists were provided. The Operations commenced in June 1961 and ended in October 1961. Summary of the Spraying Campaign is given in Annex III, Tables I and II. In West Pakistan two rounds of DDT spraying with 1 gm. per sq.met. in each round was planned. In the first round total coverage of the district was achieved while in the second round 2/3 of the district was covered. Malarimetric and Entomological survey carried out after the spraying revealed that this campaign was very successful, in spite of the preparations not being as thorough as planned. This will be evident from Malarimetric data vide Annex.III, Tables III and IV.

East Pakistan

Dinajpur district with population of 1.7 million was brought under operations. Spraying operations in East Pakistan last from March to June. In the available time, it was not possible to cover the whole district; therefore, geographical reconnaissance, mapping and numbering of houses was commenced over the whole district but the spraying operations were limited to three sectors with a population of 366,000. Operations were conducted in a modified manner. According to Plan, each Sub-sector of about 12,500 inhabitants is placed under charge of a Squad Leader recruited locally who is responsible for geographical reconnaissance and spraying operations. However, in order to intensify supervision the Squad Leaders were pooled into teams which were concentrated for geographical reconnaissance, and, after completing the task moved to the next locality. The overall output of one Squad Leader was about twenty-five houses per man per day and the operations included collection of necessary information on the forms provided for the purpose, mapping of localities and numbering of houses.

Spraying Operations

Three Sectors (366,000 population) were divided into thirty-four Sub-sectors. The dose of DDT applied was generally 2 gm. per square metre. Reduced doses were applied in six Sub-sectors with 1 gm. per sq. m. in four Sub-sectors and 1.5 gm. per sq. m. in two Sub-sectors. The same dose will be applied in these six Sub-sectors in 1962. The assessment of operations carried out during this period will show whether these reduced doses are sufficient and therefore can be used in other areas. The spraying operations which were due to commence in March were delayed due to late arrival of insecticides and spraying equipment and were started towards the end of April and took about five months to conclude. The staff for the whole district was recruited but was concentrated in one Sub-sector and after completing the task moved on to the next one in order to ensure efficient supervision. In spite of shortage of transport, etc. the total coverage obtained was almost 100%. Only 0.19% houses remained unsprayed or partially sprayed. (Summary of Spraying Campaign and Malarionetric assessment is given in Annex.III, Tables V & VI).

PLAN OF OPERATION
FOR
MALARIA ERADICATION IN PAKISTAN
(ABSTRACT)

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I. TOPOGRAPHY AND CLIMATE CONDITIONS

Pakistan has an area of 364,737 square miles, having two wings separated by 1,200 miles of Indian territory. It has a population of 94 millions in 1961 (1951 census) - 51 millions in East Pakistan and 43 millions in West Pakistan.

East Pakistan

East Pakistan 55,134 square miles in area, lies between 20°N and 27°N latitude and 83°E longitude. The climate is humid with temperature ranging from 50°F in Winter to 100°F in Summer. Rainfall varies from 75" to 150". The Southern part of the Central East Pakistan consists of the deltaic region formed by the rivers falling into the Bay of Bengal. The South Eastern area consists of hilly tracts and the rest of the area is plain. East Pakistan is subject to recurring and extensive floods in the rainy season (May - September). The Central and Coastal regions are then submerged except for limited highland areas.

West Pakistan

West Pakistan has an area of 309,239 square miles which lies between 23.5°N and 37°N latitude and 61.5°E to 75.5°E longitude. The extreme North Western part of the Province is hilly and is on an average about 3,000 ft. above sea level. The climate shows a great deal of variation in the different parts of the Province. The night temperature sometimes reaches the freezing point in Winter months (December-February) while during the day it does not rise above 80°F. In the Summer months (May-September), on the other hand, temperature rises high, even over 130°F in some areas. The annual rainfall ranges from 5" to 50" in different areas. The main rivers flowing through West Pakistan are Indus, Jhelum, Chenab, Ravi and Sutluj. The Province is usually prone to floods during the rainy season (July-September).

Malaria Epidemiology

East Pakistan

In the Eastern Province Malaria is prevalent in the dry, elevated territories, and is of minor importance in the low-lying, flooded districts. The epidemiological picture shows therefore marked differences; the disease is hyper or meso-endemic in the North West, is basically hypo-endemic in the major central part of the Province, and again reaches a high incidence in the South East. Limited foci can be found on the borders with West Bengal, a narrow strip of hyper and meso-endemicity follows strictly the Assamese foothills in the North of Mymensingh district. Therefore, because of the spotted distribution of the disease, an overall figure for Spleen and Parasite rate would not give a true picture of the endemicity.

Malaria can be classified as unstable in most parts of the Province, where A. philippinensis and A. sundaicus are the main vectors, it reaches a condition of stability in the hilly areas where A. minimus is responsible for transmission.

Malaria is not a notifiable disease, the diagnosis is established on clinical grounds only, and therefore the morbidity data available are not very reliable. Moreover, transmission occurs in seasonal coincidence with other febrile diseases.

The same applies to the mortality data (41,000 deaths in 1958).

The three main species of plasmodia, P. vivax, P. falciparum and P. malariae are found in East Pakistan. Mixed infections are frequent in the A. minimus area.

The main transmission season is from April to November, but climatic conditions allow the transmission to continue at a lower level, all the year round (mean temperature never below 60°F. Relative humidity never below 60%). Considerable importance have the pre-monsoon rains (April-May North Western rains) that coadjuvate in building up a reservoir for the monsoon transmission season. The peak of transmission occurs in October-November.

Forty-five Anopheline species are present in East Pakistan. Of these A. philippinensis is considered as the main vector in the plains, A. sundaicus in the deltaic region, and A. minimus in the hills. The part taken by suspected secondary vectors (A. culicifacies, A. aconitus and others) in transmitting the disease has still to be investigated.

West Pakistan

Malaria is endemic in the rural areas of West Pakistan and is a major health problem, affecting especially the riverain plains.

The degree of endemicity in different regions of West Pakistan varies considerably. The central districts of former Punjab and some districts of former Sind are highly malarious and hyperendemic, spleen rate reaches 80-90% in certain districts, while in the remaining malaria is moderately endemic (10-50%). Small areas in the desert tracts of Baluchistan and in the high mountainous areas of the North West Frontier area are of very low endemicity. The population at risk is estimated at thirty-five millions.

Malarionetric surveys carried out during 1960, in 31 to 51 districts indicated meso-endemicity with gross spleen rate of 23.8 and a parasite rate of 7.3.

Malaria in West Pakistan can be classified as unstable. The great fluctuation in the incidence, the periodic epidemics, the predominance of the Plasmodium vivax and the presence of A. culicifacies and A. stephensi are the factors justifying this classification.

Malaria is not a notifiable disease. Diagnosis of malaria cases in rural dispensaries is often inaccurate. From available figures it may be stated that during 1930-55 an average of 4.5 million malaria cases received treatment each year at the Government hospitals and dispensaries. This represents only 20% of all the cases referred for treatment - most of the cases do not care to report to hospitals.

The species P. vivax, P. falciparum and P. malariae are encountered in West Pakistan.

There is a definite correlation between malaria and rainfall. In the years of abnormal rainfall when flood occurs in rivers and water channels causing water-logging, the incidence of malaria becomes high in the months of September, October and November. The incidence of the disease then gradually declines during the months of January, February and March with slight rise in the months of April and May. There are two peaks of malaria transmission one in the months of July and August and the other in the months of November and December.

Out of seventeen anopheline species found in West Pakistan, A. culicifacies, A. superpictus, A. stephensi and A. fluviatilis are the suspected vectors. A. culicifacies and A. stephensi are found all over West Pakistan, while A. superpictus is encountered in Quetta Region, and A. fluviatilis in some foothill areas of the Punjab and Frontier Regions.

A. culicifacies may breed in any type of clear water collections while A. stephensi is a clear water breeder. A. superpictus and A. fluviatilis are breeders in clear running waters. They are found resting abundantly in human habitations and cattle sheds etc.

The sporozoite rates of 0.9-22.4% for A. culicifacies and 0.2% (Baluchistan) to 9.3% in Punjab for A. stephensi have been reported. No infection has been yet found in A. fluviatilis in West Pakistan. An infection rate of 4.9% has been found for A. superpictus in Quetta.

II. OBJECTIVES

The Government has the following objectives in connection with the Plan:

1. Long-term objectives

To eradicate malaria from the entire country and to prevent its reintroduction.

2. Short-term objectives

- (a) To delimit the malarious areas by a complete geographical and epidemiological reconnaissance of the country.
- (b) To determine the areas of operations in which the programme will be implemented by successive stages.
- (c) To interrupt malaria transmission by intra-domiciliary application of residual insecticides or by any other methods which may be necessary and appropriate.
- (d) To establish a suitable mechanism of epidemiological evaluations and surveillance to prove the efficiency of the work carried out and to demonstrate the interruption of malaria transmission.
- (e) To maintain active and passive surveillance activities throughout and consolidation phase of three years duration and to eliminate completely and residual foci of malaria transmission or any residual parasitaemia.
- (f) To organize an efficient system of public relations and of health education to ensure the full understanding and cooperation of the whole population from the onset of the programme until malaria is eradicated.

- (g) To train the National Personnel of all categories, technical, administrative and auxiliary, engaged in the accomplishment of the programme.
- (h) To promote the necessary regulations in order to prevent the reintroduction of malaria in the areas freed from malaria.

III. METHODS

To develop activities according to the technical methods and procedures recommended by WHO and its Expert Committees on Malaria in pursuance of the policy of the World Health Assembly. These methods are mainly:-

1. Spraying the interior of human dwellings and any other structure as may be deemed necessary with residual insecticides.
2. Establishing a system of evaluation and surveillance to assess progress of the campaign, to demonstrate interruption of malaria transmission, to detect and treat malaria cases and to eliminate any residual foci of transmission or the remaining malaria parasite carriers by appropriate measures.
3. Ensuring the cooperation of public during the different phases of the campaign by an efficient system of Public Relations and Public Health Education.

IV. ADMINISTRATION AND ASSIGNMENT OF RESPONSIBILITIES

This project will be conducted under the responsibility of the Government with the technical advice of WHO and the material assistance from other international agencies.

The overall policy of malaria eradication and the execution of the entire programme will rest with an autonomous Malaria Eradication Service under a Director who will be responsible to the Malaria Eradication Board.

This Malaria Eradication Board has been constituted by an Ordinance promulgated on 1st June 1961.

This Board is vested with the overall responsibility for determining, within the framework of this Plan of Operations, all policies, programme and directives.

The Board consists of:-

Minister for Health	Chairman
Secretary, Ministry of Finance (Expenditure)	
Director General Armed Forces Medical Services	
Director General of Health	
Director of Health Services, East Pakistan	
Director of Health Services, West Pakistan	
Col. M.K. Afridi	
Director, Bureau of National Reconstruction	
Director, Malaria Eradication Programme	Secretary

The Director of the Programme will implement the Board's programme and directives and shall be advised by WHO experts. As Secretary of the Board he will prepare agenda, reports, financial statements, future plans of action, staff proposals, progress reports and any other specific matter which may be discussed at the meetings of the Board from time to time. He will have effective control of malaria eradication funds and personnel.

In the Provinces of East and West Pakistan the Director will be represented by a Provincial Chief of Malaria Eradication assisted by a Provincial Board consisting of the following:

Director of Health Services of the Province	Chairman
Provincial Chief of Malaria Eradication	Secretary
Representative of Finance Department of the Province	
Representative of Home Department of the Province	
One expert nominated by the Central Board	

The functions and duties of the Provincial Board will be:-

- 1) To review and approve the final plans of action for each zone's operations before it is submitted for sanction to the Malaria Eradication Board.
- 2) To review during its regular sessions the progress of the programme reported by the Provincial Chief of Malaria Eradication.
- 3) To execute measures adopted by the Central Board.

The Provincial Health staff will not be in charge of the executive operation of the scheme but they will be kept informed of the progress of the eradication programme. They will remain responsible for

distribution of anti-malaria drugs in endemic malarious areas or in epidemic outbreaks pending the inclusion of such areas in the eradication programme. Except in a few strategic points all spraying operations in the country not included in the eradication programme from year to year will be suspended.

The existing malaria staff of the Provinces will be absorbed as needed in the Malaria Eradication Service.

V. PLAN OF ACTION

1. Scope of the Project

The Government intends to develop with the technical advice of WHO and the assistance of other international agencies an overall project for the eradication of malaria in Pakistan. This project will be implemented by successive stages and is expected to last from 1961-1974. The population to be protected which according to 1961 census is 51 millions in East Pakistan and 43 millions in West Pakistan is expected to increase at the rate of 1.8% in West Pakistan and 2% in East Pakistan.

2. Financing

It is estimated that the cost of the malaria eradication campaign in East and West Pakistan will reach a total of approx. Rs.52 crore (or U.S.\$ 109,316,797).

Out of this total Rs.325,517,755 represents the local expenditure, salaries of national personnel, supplies to be bought locally, transport, maintenance and miscellaneous expenses.

The balance of Rs.193,737,032 (or \$ 40,786,743) represents the cost of imported supplies and in this connection the Government will require assistance from other International Agencies.

The entire resources of the Provincial Governments and the Central Government will be pooled together in the form of a Fund to be administered by the Board. It will, however, be ensured that the Provincial contribution is utilised in its own malaria programme. The international aid will also be credited to this Fund.

3. Organization of the National Malaria Eradication Service

As mentioned above Malaria Eradication personnel will be employees of an autonomous body under a National Director. Population will be divided into regions and into zones. The zones themselves are divided into sectors and sub-sectors. The sub-sector is the elementary field unit and represents the area covered by a spraying squad or a surveillance agent and includes an average of 12,500 inhabitants in West Pakistan and 10,000 inhabitants in East Pakistan. With the exception of the regions for which the main point of consideration was the concentration of population the distribution into zones and sectors was usually made following the administrative division into districts and thanas but according to the number of population one district may be divided into two zones or several grouped together in one zone.

There will be altogether three Regions and 31 Zones in East Pakistan and four Regions and 35 Zones in West Pakistan. The number of population per zone ranges from 0.3 to 2 million in East Pakistan and from 0.6 to 1.5 million in West Pakistan.

Functions and responsibilities are distributed accordingly at each level from the National Headquarters to the Zones, namely:-

A section of Epidemiological evaluation responsible for all epidemiological and entomological investigations including laboratory activities and for surveillance operations as well as for consolidation of statistical data.

A section of field operations responsible for geographical reconnaissance, spraying operations and vehicle maintenance and repairs.

A section of Health Education.

A section of administration responsible for personnel management, financial control and accounting, supply services and warehousing.

4. The phasing of the Programme

The Malaria Eradication in East Pakistan and West Pakistan will be implemented by successive stages and is scheduled to last a minimum of thirteen years from 1960-61 to 1973-74.

Each zone will represent an independent operational unit. The programme will include four successive phases:-

- preparatory phase
- attack phase
- consolidation phase
- maintenance phase

The programme has been divided in such a way that no zone will enter into the consolidation phase until the contiguous zones are at least in the second year of the attack phase. It will be noted that the spraying operations are scheduled to last four years in West Pakistan and only three years in East Pakistan except in areas where the main vector is A. minimus where four years of spraying will be implemented.

In East Pakistan, in the areas, where recent investigations showed that malaria endemicity is very low it is suggested that during the preparatory phase which should be extended to a minimum of one year, conventional malariometric surveys be supplemented by "fever case surveys" on a total coverage basis. Entomological investigations will be made concurrently to assess the presence, the seasonal density and the bionomics of the vector species.

Should these investigations fail to demonstrate the existence of any malaria it may be decided to exclude such areas from the spraying operations and to rely on total coverage by surveillance activities to be maintained for the three years of normal duration of the consolidation phase. No decision, however, will be taken unless it is proved that no malaria transmission even at a very low level, can be detected.

It is noted that in areas of very low endemicity immunity against malaria is more or less lacking among the population and these areas are liable to severe malaria outbreaks or epidemics when climatic conditions, become particularly favourable to the breeding of the vector species.

5. Plan of work

Activities in this Plan of work are planned in accordance with the fiscal year.

5.1 Preparatory phase

This phase will start in the month of July of the first year on which each zone is going to be included in the programme and will last until the beginning of the

spraying operations. It will include:-

- i) The geographical reconnaissance of the area with the numbering of all houses or structures to be sprayed, the census of the inhabitants per house, the sprayable surface per capita, the fixing of house cards and the establishment of sketch maps of the villages.
- ii) An epidemiological pre-operational survey to complete the existing data on malaria prevalence, to confirm the season of transmission, the distribution of anopheline species with special reference to the vector species and its susceptibility to insecticides and to collect baseline data which will be used later on to assess the results of the campaign.
- iii) The initiation of Health Education activities to explain to the people the scope and aim of malaria eradication and the benefits to be expected, in order to ensure their cooperation.

At the end of the preparatory phase a Plan of Action will be worked out for each zone giving all the details of the implementation of the programme. This plan will be endorsed by the Regional Chief of Malaria Eradication, submitted for review to the Provincial Chief of Malaria Eradication and to the Provincial Board for approval to the Director of the Programme and eventually to the Malaria Eradication Board.

5.2 Attack Phase

1) Total coverage spraying operations

The insecticides to be used will be DDT wettable powder 75% or 50%. Susceptibility tests carried out in West Pakistan and circumstantial evidence in East Pakistan show that the local vector species are highly susceptible to this insecticide. The advisability of using DDT in the areas of East Pakistan where the vector is A. sundanicus will be decided later on prior to their inclusion in the Programme.

According to the recommendations of the WHO Malaria Demonstration Team (1951) spraying operation in East Pakistan will be initiated in March with a single spraying cycle and a dosage of 2 gm. of DDT sq.m.

In West Pakistan, however, taking into consideration the transmission season, the rainy season and local habits of people for repairing and replastering their houses, it has been decided to cover sprayable surface by DDT w.p. 1 gramme sq.m. (Technical) in two successive rounds of spraying, the first round to start in June and the second in August. This procedure has also been recommended by local Malaria Experts and is being followed in neighbouring countries with similar epidemiological conditions.

Timing and number of cycles of spraying operations and dosages of insecticides may be modified later on in the light of experience, gained.

In West Pakistan cities with population exceeding 20,000 inhabitants will be excluded from spraying. However, strategic barrier spraying will be applied in the premises located in the outskirts of the cities where there is no mosquito control programme in operation.

In East Pakistan no such distinction will be made.

ii) Evaluation and surveillance activities during the attack phase

Evaluation of the work carried out and the results achieved will be done from the first year of the campaign and merge into the full surveillance mechanism during the last year of the spraying operations.

The activities will be carried out under the supervision of the Evaluator of Zone and by the evaluation staff including squad leaders.

They will include:-

- a) Malariometric surveys among children of two to nine years of age in selected representative villages of each zone. These surveys will be conducted twice a year one of which will be during the transmission season.
- b) Monthly house to house visits to detect fever cases and follow up the infant parasite rate. In West Pakistan, this survey will be limited to infants and to 2-9 age group.

- c) Monthly blood film collection from the third year on, from all fever cases, on a total coverage basis.
- d) Passive surveillance will be progressively organized with the assistance of the community leaders and voluntary collaborators.
- e) Notification of all suspected malaria cases by medical institutions and private practitioners. Facilities will be provided for the examination of blood films by the Zone Laboratories of the Programme.
- f) Entomological investigations will be conducted under the technical guidance of the Regional Entomologist to check the response of the different anopheline species and mainly the vector species to insecticides, to corroborate the proper timing of the spraying operations, the optimum dosage of the insecticide to be used and the duration of its effectiveness through routine collections of anophelines for measurement of the vectors' density, susceptibility tests, bio-assays or any special studies as deemed necessary.

The main objectives of the epidemiological investigations at the zone level, during attack phase will be to substantiate the complete interruption of malaria transmission and eventually to detect the causes of any shortcomings.

5.3 Consolidation phase

The Consolidation phase will begin as soon as the spraying operations are discontinued.

The discontinuation of the spraying operations will be based on the following criteria:-

- Infant parasite rate as nil
- Number of malaria cases detected during the previous year not exceeding 0.5 per thousand on the population
- Absence of indigenous malaria cases or their limitation to small and well defined foci.

The Consolidation phase is scheduled to last three years during which the surveillance mechanism already implemented during the last years of the attack phase will be continued. The main objectives during the phase are the systematic detection and treatment of the last residual malaria cases and the complete elimination of any remaining pockets of transmission.

Detection of cases will be carried out by all possible means, namely:

- Notification of suspected cases by all Government medical institutions and by private medical practitioners.
- Active surveillance with the assistance of all voluntary collaborators, headmen of the villages, school teachers, religious leaders, Basic Democracy Union members and others.

All suspected cases will be confirmed by a blood film examination and all the facilities will be provided for blood film taking and processing.

Blood films will be examined within the shortest possible time so that proper treatment may be given to patients without delay.

When a positive case is found the source of infection should be carefully investigated to trace its origin. Cases will be classified as indigenous, imported, relapses, induced or introduced.

Particular attention will be given to the appearance of secondary cases and to local persistence of malaria transmission.

During the consolidation phase the objective of the entomological investigations will be:-

- To check the reappearance of the vectors in unusual densities in larval or adult stage and to investigate any possible change in their behaviour.
- To carry on the investigations initiated during the attack phase on the susceptibility of the vector species to insecticides.
- If any residual or active foci are discovered to study the causes of the persistence or resumption of malaria transmission with special reference to the possible role of secondary vectors.

5.4 Maintenance phase

The maintenance phase will begin when no indigenous cases have been discovered by total surveillance coverage for three consecutive years in the last two of which no spraying operations were carried out. In this period which is supposed to last until malaria is eradicated from the whole world the responsibility of case detection will be handed over to the general Health services of the country. Malaria should remain a notifiable disease and inter-country or international regulations should be promoted to prevent its re-introduction.

Beginning with the maintenance phase Malaria Eradication Service will be integrated in the general Health Service of the country. It is recommended that the entire staff who have gained considerable technical and social experience be used in other public health activities of the Government.

6. Supply and Transport system

A supply section will be established in Chittagong and Chalna in East Pakistan and in Karachi in West Pakistan for the receiving, customs clearance, warehousing and despatching of all imported supplies and equipment to various field stations. Central warehouses will be instituted in the Provinces, Regions and Zones from which supplies will be forwarded to the field according to a carefully established time table. There will be a local store in each sector where necessary supplies should be available at least one month before the beginning of the spraying campaign.

Locally purchased items will be bought mostly at the Provincial or Regional level, inventoried, stock piled in the Central warehouses and distributed likewise.

Railway facilities and public carriers will be used for the transportation of supplies and provisions are made for this expenditure in the budget estimates. Moreover a three-ton truck is provided in each region. Within the zone, vehicles assigned to each sector will be used for the transportation of supplies.

Separate stores may be provided for insecticides, spraying equipment, laboratory equipment, drugs and other items.

Deployment of transport at different levels is given in the detailed plan. The number of vehicles allotted to East and West Pakistan depends on the extent of communication facilities.

In West Pakistan provisions are made for one Dodge Power Wagon for each sector and light vehicles (Jeeps) for field supervisors and zone staff (total eighteen). Provincial and Regional Headquarters will respectively be provided with seventeen and fourteen vehicles.

In East Pakistan the same number of vehicles is provided for Provincial and Regional Headquarters. At the Zones, however, the number of vehicles varies from five to eleven. In addition, provisions have also been made for supervisory staff for motor boats in certain areas at 1-5 per zone (total 45). Moreover, local boats will be hired for transportation of spraying squads and surveillance agents.

Bicycles will be supplied to all squad leaders in West Pakistan and to some squad leaders and supervisors working in dry areas of East Pakistan.

All the vehicles assigned to the project will be registered in the Central Transport Section and Provincial and Regional Transport Officers will supervise their maintenance and repairs. Each vehicle will be provided with a driver and a log book will be maintained to keep records of the tools, spare parts; tyres provided and the daily running, fuel consumption, servicing and repairs carried out.

Workshops will be established in the Zones for minor repairs and in the Regions for major repairs.

7. Health Education

Provisions are made for Health Education for personnel from the Zone up to the National Headquarters. Health Education will be continuous process initiated during or even before the preparatory phase and maintained until malaria eradication is achieved.

The objective is to explain to the population as a whole the aim and procedure of malaria eradication and what are the immediate and long term benefits to be expected.

Methods and approach to be used will be adapted to the different levels and classes of the population. In the official circles and among the upper classes the feasibility and desirability of Malaria Eradication will be strongly emphasised and every effort will be made to ensure the understanding and cooperation of the social welfare and scientific institutions and particularly of the medical profession both in the Government and private practice. Mass media of information such as radio talks, press releases, group meetings or conferences will be used for this purpose. The public will be kept regularly informed of the development and progress of the campaign.

Health Education at "OPERATIONAL" level, that is, in the village where eradication activities are to be carried out will require a different approach. The objective will be to explain to the people concerned that malaria eradication is not a superimposed health programme but a community undertaking which cannot succeed without their active and individual participation.

During the preparatory phase, health educators will contact the headmen of the villages, the school teachers and the religious leaders and explain by direct talk to the people the entire process of malaria eradication. It will be emphasised that although spraying operations are the first step to be taken malaria eradication will be later accompanied by a variety of operations of equal importance for its final success, and that any collateral benefits such as the reduction of house pests are only side-effects and should not be considered as the aim of the campaign or the test of its efficiency.

During the attack phase villagers will be required:-

- to prepare their houses and to accept and facilitate the spraying operations,
- not to wash or erase the insecticide deposits from the walls,
- not to replaster their houses after the spraying operations during the transmission season,
- to report the newly built houses or the houses unsprayed,
- to permit the malaria staff to enter their houses on request for routine investigations.

During the surveillance and consolidation phase cooperation of the population will include:

- The acceptance of blood film taking from fever cases or any other person if required and especially from infants.
- The acceptance of treatment.
- Reporting of suspected cases to the surveillance agents by voluntary workers.

Special attention will also be given to the Health Education of all the staff engaged in malaria eradication.

Lectures on Health Education are part of the curriculum in the Training Centres for Senior and Junior Staff. Briefing of Malaria Inspectors, Squad Leaders, and Spraymen will be ensured by the Health Educator at the Region or Zone level. All the Malaria Staff should know how to establish good relations with the public, how to gain their confidence and how to answer any question relating to their own activities or to the main aspects of the programme.

8. Training of personnel

Two Training Centres have been established, one in Dacca in the Malaria Institute and the second in Lahore in the Institute of Hygiene and Preventive Medicine for training of the Senior and Junior personnel.

The training programme will include academic, practical and field training for each senior and junior course to cover a period of three months according to the curricula, technical methods and procedures recommended by WHO.

Senior courses will be attended by malariologists, entomologists, engineers and other personnel possessing university degrees or comparable professional and academic qualifications.

Junior courses will be for field supervisors, sector chiefs, inspectors, assistant inspectors and comparable personnel.

Special courses will be provided for Laboratory technicians (Haematology and Entomology).

Training of other field personnel such as supervisors or squad leaders will be carried out at the Region or Zone level.

In addition to their training at the training centres all recruits will receive in-service field training in the Zones under operation. Medical Officers or other key personnel such as sanitary engineers or entomologists may be deputed if needed for training in International courses or for field visits to Malaria Eradication projects, in other countries with possible assistance from WHO or other International Agencies.

9. Use of Anti-malaria drugs

Anti-malaria drugs are now considered as an important adjuvant to malaria eradication measures. At the beginning of the attack phase drugs will mainly be used to relieve the patients from their untoward symptoms and to induce the population to accept more willingly the eradication activities as a whole.

As soon as extensive blood surveys or fever case surveys are initiated, drug administration will have the specific objective to deplete the reservoir of infection and to speed up the interruption of transmission.

When the third or the fourth year of the attack phase is completed and full surveillance instituted the aim will be the radical cure of all confirmed cases.

Dosages and schedules of treatment will be devised accordingly.

During the first years the treatment will be a single dose treatment with chloroquine (or amodiaquine) and pyrimethamine (600 mg. chloroquine or amodiaquine base and 50 mg. pyrimethamine adult dose). The drugs will be given to the patient or suspected cases before blood film taking.

When surveillance has started confirmed cases will be treated as follows:-

P. falciparum cases

Three days course

chloroquine (base)

1st day 900 mg (in two doses)
2nd day 300 mg
3rd day 300 mg

P. vivax and P. malariae cases

Three days chloroquine course
as above followed by:

Primaquine 15 mg,

daily during 14 days.

(under medical supervision)

Effectiveness of treatment will be checked by followed up blood film examination carried out every two weeks for three months in P. falciparum cases and for four to six months in P. vivax or P. malariae cases.

This follow-up survey is essential during the consolidation phase in order to ascertain the radical cure of the infection.

Experiments will be carried out to check whether it is possible to reduce the duration of the primaquine treatment to five days. Experience in other countries shows that primaquine can be safely given to children even one year of age in appropriate doses.

MALARIA ERADICATION LAW OF PAKISTAN

ORDINANCE NO. XVIII OF 1961
Rawalpindi 1st June 1961

AN ORDINANCE

To establish Malaria Eradication Board

WHEREAS it is expedient to provide for the establishment of a board for eradication of malaria from Pakistan and prevention of its re-introduction therein and matters connected therewith and incidental thereto;

NOW, THEREFORE, in pursuance of the Proclamation of the seventh day of October, 1958, and in exercise of all powers enabling him in that behalf, the President is pleased to make and promulgate the following Ordinance:-

1. Short title, extent and commencement

- (a) This Ordinance be called the Malaria Eradication Board Ordinance, 1961,
- (b) It extends to the whole of Pakistan,
- (c) It shall come into force at once.

2. Definitions

In this Ordinance, unless there is anything repugnant in the subject or context:

- (a) "Auditor-General" means the Controller and Auditor General of Pakistan;
- (b) "Central Board" means the Malaria Eradication Board established under Section 3;
- (c) "Fund" means the Malaria Eradication Fund referred to in Section 9;
- (d) "Provincial Board" means a Board constituted under Section 6; and
- (e) "Regulation" means a regulation made under this Ordinance.

3. Establishment of the Central Board and Incorporation

(1) As soon as may be after the commencement of this Ordinance, the Central Government shall establish a Central Board to be called the Malaria Eradication Board.

(2) The Central Board shall be a body corporate by the name of the Malaria Eradication Board, having perpetual succession and a common seal, with power to acquire, hold and dispose of property, both moveable and immovable, and shall by the said name sue and be sued.

4. Composition of the Central Board

The Central Board shall consist of the following members, namely:

- (a) the Minister for Health, Government of Pakistan, who shall also be the Chairman of the Central Board;
- (b) the secretary to the Government of Pakistan in the Ministry of Finance (Expenditure);
- (c) the Director-General, Health, Government of Pakistan;
- (d) the Director-General of the Medical Services of the Armed Forces, Government of Pakistan;
- (e) the Director, Health Services, East Pakistan;
- (f) the Director, Health Services, West Pakistan;
- (g) the Director, Bureau of National Reconstruction, Government of Pakistan;
- (h) the Director, Malaria Eradication Programme, Government of Pakistan, who shall also be the Secretary of the Central Board; and
- (i) one person having expert knowledge of malaria eradication to be appointed by the Central Government.

5. Functions of the Central Board

(1) The Central Board shall formulate schemes and adopt unified and coordinated measures for eradication of malaria from Pakistan and prevention of its re-introduction therein and lay down the policy with respect to the execution by the Provincial Boards of any such scheme or measures.

(2) Without prejudice to the generality of the provisions of sub-section (1), a scheme or measure formulated or adopted by the Board may relate to:

- (a) the spraying of buildings and other premises with insecticides;
- (b) the surveys of the country;
- (c) the medical examination of the people;
- (d) the treatment of persons suffering or suspected to be suffering from malaria;
- (e) the delimitation of malarious areas and the areas free from malaria and measures to prevent introduction or re-introduction of malaria in the latter areas; and
- (f) such other measures considered necessary for carrying out the purposes of this Ordinance.

(3) Measures adopted by the Central Board shall be executed by the Provincial Board for which necessary funds shall be provided by the Central Board.

(4) The Central Board may, for carrying out the purpose of this Ordinance:

- (a) ask for and receive contributions from the Central Government the Provincial Governments, or any person, agency, institution or organization; and
- (b) take technical advice and any assistance from the World Health Organization or any other international agency or agencies.

6. Provincial Boards

(1) The Central Board shall constitute for each Province a Provincial Board consisting of the following members, namely:

- (a) The Director of Health Services of the Province who shall be the Chairman of the Provincial Board;
- (b) One officer to represent the Finance Department of the Provincial Government to be nominated by that Government;

- (c) One officer to represent the Home Department of the Provincial Government to be nominated by that Government;
- (d) The Chief Officer of the Central Board for Malaria Eradication in the Province, who shall be the Secretary of the Provincial Board, and
- (e) One person having expert knowledge of malaria eradication to be nominated by the Central Board.

(2) The functions of a Provincial Board shall be:-

- (a) to prepare and submit to the Central Board plans, showing estimated expenditure, for eradication of malaria in the Province;
- (b) to execute measures adopted by the Central Board;
- (c) to review periodically the progress of the execution of such measures; and
- (d) to perform such other functions as the Central Board may, from time to time, direct.

(3) A Provincial Board shall discharge its functions under this Ordinance in accordance with such direction as may, from time to time be given to it by the Central Board.

7. Meetings and Procedure

(1) The meetings of the Central Board or a Provincial Board will be held at such times and at such places as the Chairman thereof may direct and shall be presided over by such Chairman.

(2) The meetings of the Central Board or a Provincial Board shall be conducted in accordance with such procedure as may be prescribed by regulations and until such regulations are made in such manner as the Chairman thereof may direct.

(3) The powers and functions of the Chairman of the Central Board or, as the case may be, of a Provincial Board, shall, in the absence of such Chairman, be exercised and performed by such member of the Board, as the Chairman thereof may direct.

8. Officers and Servants of the Board

The Central Board may appoint or employ, in such manner and on such terms and conditions as may be prescribed by regulations, and until such regulations are made, as may be determined by its Chairman, such officers and servants including advisers as it considers necessary for the efficient performance of its functions.

9. Fund

(1) All receipts of the Central Board from any source whatsoever shall be credited to a Fund to be called the Malaria Eradication Fund which shall vest in the Central Board.

(2) The Fund shall be administered in such manner as may be prescribed by regulations and until such regulations are made, as may be determined by the Chairman of the Central Board, shall be applied to meet all expenditure connected with the execution of any scheme or measure formulated or adopted under this Ordinance and all charges necessary for the discharge of the functions of the Central Board and the Provincial Boards.

10. Audit and Account

(1) The Central Board and the Provincial Boards shall maintain accounts of their receipts and expenditure in such manner and form as may be prescribed by the Auditor-General.

(2) The accounts of the Central Board and the Provincial Boards shall be audited by the Auditor-General or any officer authorised by him every year in such manner as the Auditor-General may think fit.

(3) The Auditor-General shall, as soon as possible after the completion of the audit, send to the Central Board a report on the said accounts and the Central Board shall, with its comments thereon, forward it, to the Central Government.

(4) The Central Board or as the case may be, a Provincial Board shall take steps forthwith to remedy any defects or irregularities pointed out in the report under sub-section (3).

11. Budget and Annual Report

(1) The Central Board shall, before the close of every financial year; prepare and approve an estimate of its income and expenditure for the next succeeding financial year.

(2) The Central Board shall, at the close of every financial year, submit to the Central Government a report on the workings of the Central Board and of the Provincial Boards during that financial year.

12. Power to require and prohibit doing of certain things

(1) The Central Board or a Provincial Board or any person authorised by such Board may, by order:

- (a) require any person to undergo medical examination and treatment;
- (b) require every person having knowledge or information of any case of malaria or suspected malaria to report the case to any specified authority;
- (c) prohibit from washing, white-washing, plastering, painting or applying any other surface treatment with respect to any building or other premises sprayed with insecticide during a period of five months from such spraying; and
- (d) prohibit doing of anything with respect to any engineering, agricultural or industrial projects, which may increase the extent and spread of malaria.

(2) Any person authorised by the Central Board or a Provincial Board may apply insecticide, collect mosquitoes, check insecticide deposits, take blood films and do such other acts as are considered necessary to eradicate or prevent malaria or collect information relating to malaria and for any such purpose enter into any premises.

(3) Whoever, contravenes an order under sub-section (1) or obstructs or resists any person acting under sub-section (2) shall be punishable with imprisonment for a term which may extend to three months or with fine which may extend to five hundred rupees or with both.

13. Public Servant

Every person acting or purporting to act under this Ordinance shall be deemed to be a public servant within the meaning of section 21 of the Pakistan Penal Code.

14. Bar to Proceedings

No suit, prosecution or other legal proceeding shall lie against the Central Board or a Provincial Board or any person for anything, in good faith, done or intended to be done under this Ordinance.

15. Delegation of Powers

The Board may, by order in writing, delegate, subject to such conditions or restrictions, as it may think fit to impose, all or any of its powers and functions under this Ordinance to any of its members, officers or servants or, with respect to the exercise of any such power or function in a Province, to the Provincial Board concerned.

16. Regulations

The Central Board may make regulations for carrying out the purposes of this Ordinance.

WEST PAKISTAN
SUMMARY OF 1961 SPRAYING CAMPAIGN

	Existing Number	First round	Second round	Pending Houses
Localities	1,721			
Houses	260,923			
Inhabitants	1,126,593			
No. of Sectors under Operation		10	7	3
Localities sprayed		1710	1075	359
Total sprayed houses		234239	146319	11032
No. of Inhabitants		1025225	623913	43116
Partially sprayed houses		7620	3711	18
No. of Inhabitants		41263	1390	53
Not sprayed houses		19010	110983	529
No. of Inhabitants		60103	45874	1072
% of unsprayed houses to the existing		8.1	42.4	0.6
Tech. DDT gm. per sq.m.		1.18	0.96	1.02
DDT 75% w.d.p. in pounds		59559	89013	6520
DDT 50% w.d.p. in pounds		184701	4161	-
Square metre per sprayman/day		2218	2311	1026
No. of houses per sprayman/day		9.8	10.4	5.5

WEST PAKISTAN
DETAILED DATA REGARDING 1961 SPRAYING CAMPAIGN
IN SHEIKHUPURA DISTRICT

Existing No. of:-

Sectors	10
Sub-sectors	79
Localities.	1721
Houses	266923
Population	1126577

WORK PERFORMED

	<u>First round</u>	<u>Second round</u>	<u>Pending Houses</u>
No. of sectors under operation	10	7	3
No. of sub-sectors under operation	79	54	25
No. of localities sprayed	1710	1078	359
<u>Houses totally sprayed (T)</u>			
No. of houses	234239	146319	11032
No. of inhabitants	1025225	623913	43116
<u>Houses Partially Sprayed (P)</u>			
No. of houses	7620	3711	18
No. of inhabitants	41265	21390	53
No. of sprayed rooms	14170	9402	47
<u>Houses not Sprayed (X)</u>			
No. of houses	19010	110893	529
No. of inhabitants	60103	475874	1072
% of unsprayed houses to the existing number	8.1	42.4	0.6

Contd.

	<u>First round</u>	<u>Second round</u>	<u>Pending Houses</u>
<u>Insecticides</u>			
DDT 75% w.d.p. used in pounds	59559	89013	6520
in Kgs.	27016	40376	2957
DDT 50% w.d.p. used in pounds	184701	4161	-
in Kgs.	83780	1887	-
Technical DDT per square metre	1.18	0.96	1.02
<u>Personnel</u>			
Total number of man/days all personnel	33457	19658	2886
Total number of man/days spraymen only	23796	13936	2104
Square metre per sprayman day	2218	2311	1026
Houses " " " "	9.8	10.4	5.5
Highest number of sanitarian working	2	2	-
" " " Sector Chief (M.I)	9	7	2
" " " Asst.Sector Chief(AMI)	5	3	2
" " " Squad leader	79	54	25
" " " Spraymen	395	260	135
" " " Mixers	79	54	25
<u>General information</u>			
<u>Averages:</u>			
Square metre per capita	50		
" " " house	225		
" " " room	80		
Sprayers used	Hudson Perfect 310 B		
Nozzle Tips used	8002		
Period of changing Nozzle tips	once every 15 days		
Organization of Squads	Independent start 1 Squad leader		
	5 Spraymen		
	1 Mixer		
Methods of mixing DDT	Individual per squad in bucket in each house.		

Expenses

The following is a summary of expenses for 1961 DDT Spraying Operation in Sheikhpura district.

Expenses are calculated for all rounds of DDT Spraying Operation (1st round, 2nd round and pending houses) during the period from 15 June to 31 October, 1961.

All expenses are taken from the actual finance expenditure registration of District Headquarters.

	<u>DESCRIPTION</u>	<u>COST IN RUPEES</u>
<u>Personnel</u>		
	Salaries paid for field operational staff Months from June to October, 1961.	163266.26
<u>Insecticides</u>		
	DDT 75% w.d.p. used amount used lbs.155092 (1.68 Rupees per Pound)	260554.56
	DDT 75% w.d.p. used amount used lbs.188862 (1.57 Rupees per Pound)	296513.34
<u>Transport</u>		
	Petrol and Lubricants	13254.48
	Repairs of Vehicles and Spare parts	2793.40
	Hiring of Vehicles	7500.00
	Depreciation of vehicles (10% of the total cost of the vehicles for the period of the operation).	9989.00
<u>Equipment</u>		
	Depreciation 20% of Hudson Sprayers) 500 Sprayers appr. cost per each 100 rupees)	10000.00
	Spare parts for sprayers	2000.00
	Nozzle Tips	6500.00
	Filling and mixing equipment total cost	
	Rs.7451 Depreciation of 25%	1862.75
	Stationery and Forms	1600.00

Contd.	<u>DESCRIPTION</u>	<u>COST IN RUPEES</u>
	<u>Miscellaneous</u>	
	DDT Freight Charges, DDT unloading and minor repairs	5467.05
	Rents of Zone H.Q. and Sector field Stations	3820.14
	Water and Electric for Headquarters	<u>610.69</u>
	GROSS TOTAL OF EXPENSES	785731.67

Analysis of Costs

Cost of per capita (person) per round	0.46
Cost per House " " "	1.98
Percentage of DDT expenses to the total cost	70.52%
Percentage of salaries to the total cost	21.05%
Percentage of transport expenses to the total cost	4.50%
Percentage of other expenses to the total cost	3.93%

WEST PAKISTAN
SUMMARY OF THE ASSESSMENT OF PARASITE RATE AND INFANT PARASITE
RATE IN SHEIKHUPURA DISTRICT BEFORE AND AFTER
SPRAYING

INFANT PARASITE RATE	1 9 6 0			1 9 6 1		
	September	October	November	September	October	November
No. village	114	142	46	40	28	34
No. Ex.	334	734	183	357	152	183
+	37	65	23	4	0	6
IPR	11.0	8.8	12.5	1.1	0.0	3.2
GROSS PARASITE RATE						
No. village	240	310	238	76	46	50
No. Ex.	8722	6509	4253	3821	1495	2699
+	1550	743	829	114	36	128
PR	17.7	11.4	19.4	2.9	2.1	4.7

WEST PAKISTAN
ASSESSMENT OF MOSQUITO DENSITY IN SHEIKHUPURA DISTRICT DURING OCTOBER & NOVEMBER IN SPRAYED & CONTROL STATIONS

No. of Station	Date Sprayed	Date Surveyed	No. of days after sprayed	A. Culicifacies		A. Stephensii		A. subpictus		A. pulcherrimus		A. annularis		Total	
				F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.
1.	17 Aug.	3 Oct.	47	0	0	0	0	684	318	2	0	0	0	686	318
2.	11 July	5 Oct.	86	0	0	0	0	451	220	0	0	0	0	451	220
3.	2 Oct.	4 Oct.	2	0	0	0	0	115	19	0	0	0	0	115	19
4.	Control	6 Oct.		40	5	0	0	1482	774	86	7	6	0	1614	786
5.	20 Sept.	7 Oct.	7	0	0	0	0	611	245	10	0	0	0	611	245
6.	6 Sept.	9 Oct.	33	0	0	0	0	1254	480	0	0	0	0	1254	480
7.	15 Sept.	11 Oct.	26	0	1	0	0	985	481	0	0	0	0	985	482
* 8.															
9.	10 July	13 Oct.	95	0	0	0	0	379	434	0	0	0	0	379	434
10.	25 Sept.	14 Oct.	19	0	0	0	0	279	194	0	0	0	0	279	194

* No survey was made at this time.

No. of Station	Date Sprayed	Date Surveyed	No. of days after sprayed	A. Culicifacies		A. Stephensii		A. subpictus		A. pulcherrimus		A. annularis		A. hyrcanus		Total	
				F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.
1.	17 Aug.	17 Oct.	61	0	0	0	0	192	110	0	0	0	0	0	0	192	110
2.	14 Oct.	19 Oct.	5	0	0	0	0	419	187	0	0	0	0	0	0	419	187
3.	2 Oct.	18 Oct.	16	0	0	0	0	494	91	4	0	0	0	0	0	498	91
4.	Control	20 Oct.		33	16	2	0	4227	3085	132	9	0	0	1	0	4395	3094
5.	30 Sept.	21 Oct.	21	0	0	0	0	849	481	0	0	0	0	0	0	849	481
6.	6 Sept.	23 Oct.	47	0	0	0	0	1401	1224	0	0	0	1	0	0	1402	1224
7.	15 Sept.	25 Oct.	40	0	0	0	0	1165	1007	0	0	1	0	0	0	1166	1007
8.	30 Sept.	26 Oct.	26	0	0	0	0	952	204	1	0	0	0	0	0	953	204
9.	18 Oct.	27 Oct.	9	0	0	0	0	314	203	0	0	0	0	0	0	314	203
10.	25 Sept.	28 Oct.	33	0	0	0	0	276	165	0	0	0	0	0	0	276	165

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Table IV

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EAST PAKISTAN
SUMMARY OF 1961 SPRAYING CAMPAIGN

ZONE No. I DINAJPUR DISTRICT
(Sectors 1.2 & 3)

Sector No.	1			2			3			TOTAL		G.TOTAL
Sub-sector Nos.	2,3,4, 7 & 8 (6)	1 & 5 (2)	1,3,5,6,8,9 10,11,12, 13,14,(12)	7 (1)	2 (1)	2,3,4,5,6, 7,9,10,11& 12 (10)	8 (1)	1 (1)	2 grm/ sqm	1.5 grm/ sqm	1 grm/ sqm.	
Tech. DDT to be applied	2 grm/ sqm.	1 grm/ sqm.	2 grm/ sqm.	1.5 grm sqm.	1 grm/ sqm.	2 grm/ sqm.	1.5 grm/ sqm.	1 grm/ sqm.				
<u>A. Work completed</u>												
Structure sprayed	15230	5330	31394	3433	1784	21780	3257	1579	68404	6690	8693	83787
Rooms sprayed	54800+ 7897	20346+ 4218	124505+ 30718	12756+ 3368	7130+ 1860	101613+ 28961	13499+ 3871	7387+ 2081	280918+ 67576	26255+ 7239	34863+ 8159	342036+ 82974
Inhabitants protected	68652	26005	134966	12528	8581	92239	13827	6832	295857	26355	41418	363630
Surface area sprayed.	3231329	1146686	6473300	714793	365720	5024865	748495	342415	14729494	1463288	1854821	18047603
<u>B. Work not completed</u>												
Structures part. sprayed	16	-	29	-	35	2	-	-	47	-	35	82
Rooms spr. in sts.part.spr.	508+97	-	2210+441	-	196+49	453+160	-	-	3171 +698	-	196+49	3367+747
Surface area sprayed in sts.partially sprayed	35255	-	141440	-	12544	24915	-	-	201610	-	12544	214154
Structures not sprayed	80	1	62	-	21	2	-	-	144	-	22	166
(a) Unwilling.	4	-	10	-	8	-	-	-	14	-	8	22
(b) Closed.	74	-	44	-	13	2	-	-	120	-	13	133
(c) Under construction.	2	1	8	-	-	-	-	-	10	-	1	11

Sector No.	1		2		3		TOTAL		G:TOTAL			
Sub-sector Nos.	2,3,4, 7 & 8 (6)	1 & 5 (2)	1,3,5,6,8,9 10,11,12 13,14,(12)	7 (1)	2 (1)	2,3,4,5,6, 7,9,10,11& 12 (10)	8 (1)	1 (1)	2 grm/ sqm.	1.5 grm/ sqm.	1grm/ sqm.	
Tech. DDT to be applied	2 grm/ sqm.	1 grm/ sqm.	2 grm/ sqm.	1.5 grm/ sqm.	1 grm/ sqm.	2 grm/ sqm.	1.5 grm/ sqm.	1 grm/ sqm.				
<u>C. Insecticide.</u>												
DDT 75% W.D.P. Kgs	12390.9	1753.5	25777.5	1511.0	540.5	14710.6	2252.4	676.9	52879.1	3763.4	2971.0	59613.5
Tech. DDT Kgs.	9293.2	1315.1	19333.2	1133.2	405.3	11033.0	1689.3	507.7	36659.3	2822.6	2228.2	44710.1
<u>D. Workers.</u>												
No. of man/days Spraymen	2408	554	5692	466	271	3352	574	320	11452	1040	1195	13637
No. of man/days all workers	3704	890	8756	706	415	4817	852	497	17277	1558	1795	20630
Structures/Sprayman/day	6.3	9.6	5.6	7.4	6.7	7	5.5	5	6.1	6	7.5	6.2
Sqm/Sprayman/day	1356.6	2069.8	1164.0	1534.0	1395.7	1506.5	1204.0	1070.0	1303.0	1407.0	1631.0	1339.0
% Spraymen/total workers	65%	62%	65%	66%	65%	69%	67%	66%	66%	66%	64%	66%

EAST PAKISTAN
ASSESSMENT SURVEY IN ZONE 1
Result of Blood Examination
S U R V E Y

B A S E L I N E					S U R V E Y					A S S E S S M E N T				S U R V E Y						
Thana	Sector	Date	No. of Villages	No.Ex.	P o s i t i v e					P.R.	Date	No. of Villages	No.Ex.	P o s i t i v e					P.R.	G.R.
					V	F	M	Mix	Tot					V	F	M	Mix	Tot		
TETULIA	1	XI.60	7	383	51	14	1	-	66	17.3	XI.61	10	1157	452	13	3	9	459	39.7	1.9
PANCHAGARH	1	XI.60	7	431	59	51	1	4	107	25.0	XI.61	8	1337	91	34	-	2	123	9.2	0.6
BODA	2	XI.60	33	2059	764	585	3	29	1323	64.3	XI.61									
DEBIGANJ	2	XI.60	10	510	141	123	1	11	254	50.0	XI.61	10	1614	401	49	4	2	452	28.0	1.5
ATWARI	3	VII.60	11	608	79	63	5	10	137	22.7	XI.61	12	960	457	30	1	8	480	50.0	2.1
BALIADANGA	3	VII.60	9	448	51	62	4	8	109	23.5	XI.61	9	910	404	17	-	7	414	45.5	1.2
T O T A L S			77	4439	1145	898	15	62	1996	28.3*		49	5978	1805	143	8	28	1928	32.2	1.4
* The Parasite Rate is calculated excluding BODA Thana.																				
N.B. The consolidated results for BODA Thana 1961 have not yet been received.																				
BODA	-	-	-	-	-	-	-	-	-	-	-	28	3478	762	191	8	16	945	27.3	1.8
T O T A L S			77	4439	1145	898	15	62	1996	44.97		77	9456	2567	334	16	44	2873	30.4	1.5
%					55.32	43.73	0.96		100.0				87.29	12.11	0.60		100.0			