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THE MALARIA PROBLEM IN WEST PAKISTAN

by

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1. GEOGRAPHY OF WEST PAKISTAN

The West Pakistan province extends from 61½ degrees East to 75½ degrees East between the parallels of 23½ degrees North and 37 degrees North. The extreme northwest part of the province is hilly and is on the average about 3,000 feet above sea level. The extreme southern part is desert while the rest of the province is alluvial. The main rivers are Indus, Jhelum, Chenab, Ravi and Sutlej. For the last ten years floods have become an annual feature. Hill torrents are also responsible for floods in some areas.

The annual rainfall ranges from five to fifty inches in different areas. From the middle of July to the middle of September the rainfall is due to the southwest Monsoon or the cyclones associated therewith.

The climate is subtropical and is subject to a good deal of variation in different parts of the province. In January and February the night temperature sometimes reaches freezing point, while during the day the mercury does not rise above eighty degrees Fahrenheit. In summer months, on the other hand, the temperature rises high, even over 120 degrees Fahrenheit in some parts.

The bulk (almost ninety per cent) of population depends on agriculture for a living. The main crops are Wheat, Rice, Cotton and Sugar-cane.

Several canal irrigation projects were constructed in the province during the past one hundred years. These projects have been responsible for water-logging of large tracts of land which form favourable breeding grounds for mosquitoes. Roads and railway embankments and borrow pits have added to the number of breeding places.

House building operations are at their peak almost everywhere in the province and the large number of pits left after excavation of earth form important breeding places.

The means of communication are very poor in rural areas. Some villages are unapproachable even by jeeps.

2. DEMOGRAPHY OF WEST PAKISTAN

The total area is approximately 312,000 square miles and population is about thirty three million according to 1951 census, giving average density of 105 persons per square mile but this varies markedly in different areas being 302 in central districts and only ten in Baluchistan. The population is eighty five per cent rural and fifteen per cent urban.

There are 230 towns and about 40,000 villages. Size of the latter varies from shall hamlets hardly consisting of three or four houses to large compact villages of about 5000 population. The percentage of literates is about ten.

3. IMPORTANCE OF MALARIA

Malaria in West Pakistan, is a problem of great magnitude on account of morbidity as well as mortality caused by it. Rural malaria is the chief health problem in West Pakistan, where a large majority of the population of the province lives and suffers from malaria. It is estimated that in West Pakistan nearly two million persons suffer from malaria in a year and a rate of eight per thousand of population might not be an unreasonable estimate of deaths due to direct and indirect effects of malaria. Besides cutting short the life, malaria is considered to be responsible for a large number of abortions, premature births and one of the main causes of sapping human vitality. It is an important fact that in West Pakistan the high incidence of malaria coincides with the harvesting and sowing of the main crops. It will thus be evident that at the time when the rural population should be behind the plough or harvesting, they are down with fever and unable to attend to their duties. This greatly retards the output of the agricultural produce through loss of working hours and consequently affects the economy of not only the individual, but of the province as a whole.

The effects of malaria in hindering and retarding the progress of agricultural development in different parts of Pakistan is evident from the fact that the economically important districts of the province are also the highly malarious areas. This is due to the fact that the rice and sugar-cane producing districts, as already stated, have become water-logged due to the net-work of irrigation channels. In the water-logged districts the deterioration in health is marked. This state of affairs is particularly

so in the central districts of the former Punjab and also in districts of the former Sind, irrigated with the Sukkur Barrage Scheme. In the water-logged districts the number of malaria cases gradually increases and during epidemics assumes enormous proportions, so much so that 90% of the population suffers from it at some time or other.

4. EPIDEMIOLOGY OF MALARIA IN WEST PAKISTAN

The exact proportion of "fever" deaths due to malaria is unknown, but it is estimated that 20% of deaths in the province are traceable to this one disease alone.

From annual reports of hospitals and dispensaries of sixteen central districts of the province the proportionate morbidity varies from ten per cent to thirty per cent. The disease is widespread, affecting especially the riverain plains In some parts of the province it has been made more severe by the engineering works e.g. the building of irrigation canals, rice cultivation, road and railway embankments and dams.

The vectors are A. culicifacies, A. stephensi, A.superpictus and A. fluviatilis. The latter two are prevalent in N.W.F.P. and Baluchistan areas and the former in Punjab and Sind areas. Out of these A. culicifacies is the most important vector having a wide range in rural as well as urban areas whereas A. stephensi is mostly limited to urban areas.

For breeding, A. culicifacies prefers clean fresh water specially in irrigation channels, in seepage water, slow-moving streams, nullahs and ditches, pools in sandy river beds, freshly formed collections of rain water tanks, borrow-pits with grassy edges, fallow rice fields, sometimes well excavations, wheel-ruts and wallows. Almost all type of these breeding places in very large numbers exist in West Pakistan.

Although large scale systematic studies on Parasite rates, sporozoite rates, mosquitoes survival rates, spleen rates, mosquitoes' feeding frequency and resistance to DDT etc. have not been carried out in recent years, yet a few isolated investigations on a limited scale have been conducted on these subjects. Their brief resumé can be presented here to understand the nature of the problem from a technical point of view.

(a) In 1953-54 mosquito catches carried out in six villages outside Lahore Corporation area revealed the following prevalent anopheline species existing in the area: A. subpictus: July, August and September; Maximum 87.3 per cent of the catches. The minimum was about one per cent. in January and February.

A. annularis: in January, February and March. 73 to 94 per cent. and it came down to 1.9 per cent. in July, August and September.

A. pulcherrimus: It was highest during the October and April (43 per cent) and lowest during July to September (7 per cent).

A. stephensi: Maximum in March, April and May (30 per cent).

A. Culicifacies: Maximum in October, November, December and January (15 per cent).

A. hyrcanus, A. fluviatilis, A. splendidus and A. turkhudi were very rare.

(b) The results of 15,275 blood films examined for malaria parasites and 12,523 spleen palpations made in West Pakistan were analysed. The bulk of data pertains to central districts. These data were collected intermittently for eleven years between 1939 and 1957. Out of 15,275 blood films collected over a period of eleven years in the northern half of West Pakistan 1,977 (12.9 per cent), were positive for malarial parasite. During the same period 12,523 spleens were palpated for splenomegaly and 3,318 (26,5 per cent) were found enlarged.

It may be mentioned that during the last 75 to 80 years the central districts have been notorious for explosive autumnal malaria epidemics of great severity at more or less regular intervals of about eight years. Since 1952 DDT has been used as an imagocide, with varying intensity and regularity throughout the area from which the examined films and spleens were collected.

(c) An antimalaria scheme for Lahore Corporation area was enforced in July 1951. This scheme for Lahore envisaged control of mosquitoes and malaria in Lahore by organizing and carrying out an intensive campaign against the aquatic stages of the insect and supplementing it with adulticidal measures to ensure rapid destruction of the vectors.

To evaluate the work done, in December 1951, a house to house survey was done in 31 treated villages and six control villages. The average number of mosquitoes recovered per room was 0.22 in treated villages against 15.00 in the control villages. Clinical malaria cases which occurred between 1 August and 31 December 1951 were 8.5 per thousand of population in the treated villages against 38.7 per thousand of population in control villages. Again between 1 August and 31 December 1952 malaria incidence was found to be 14 per thousand of population in treated villages against 68 per thousand of population in the seven control villages during the same period.

The cases of enlarged spleen amongst school children showed decline from 2.6 per cent. in 1950 to 0.9 per cent. in 1952.

The incidence of mosquitoes showed similar decline. The results of weekly catches of mosquitoes made between 1 September and 31 December, 1952, from 38 catching stations showed anophelines average number per room 0.3 and culicines 0.6 per room in treated villages against anophelines 311 and culicines 3.6 per room in control villages.

(d) In Karachi between November 1947 and May 1951, 22,223 A. stephensi, 9,869, A. culicifacies, 369 A. subpictus and 87 A. pulcherrimus were dissected. No sporozoites were found in any of them except in A. culicifacies. Amongst A. culicifacies the sporozoite rate was found to be 0.8 per cent.

(e) Malaria survey carried out in Kohat-Hangu valley Kohat district, N.W.F.P., West Pakistan in August-December 1949, showed that malaria accounted for 80% of the total illness. Malaria was found to be endemic, but its incidence assumed great proportions from July onwards shooting up suddenly in the months of August-October. The spleen rate ranged between 2.0% and 79.0% in villages surveyed for spleen census. In 10 villages in which the parasite rate was determined, it varied from 3.4% to 23.0%. Breeding places of anophelines were located, and it was found that of the several varied and abundant breeding places, borrow pits and drain-pits were the most dangerous. Twelve different species of Anopheles were encountered out of which A. culicifacies showed sporozoites in the glands. Judging from the sporozoites rate, it was inferred that the transmission period of malaria in the valley is from July-October. Precipitation test showed an anthropophilic index of 70.0 and 65.7 in A.fluviatilis and A. culicifacies respectively.

(f) A malaria survey of the Baluchistan area adjacent to the Iran Border was undertaken from 28 March 1957 to 14 April 1957. The spleen rate in children between 2-10 years varied from 0.0 to 57.7%. The parasite rate in children between 2-10 years varied from 0.0 to 23.4%.

(g) A study to find out the resting habits as well as the height at which the two malaria vector species A. culicifacies and A. stephensi rest on the walls inside the houses was undertaken in central districts.

The study was continued from 1952 to 1955. The data collected indicated that the vector species rested in uniformity throughout the height of the wall inside the rooms.

(h) Development of resistance of mosquitoes to DDT has been recently studied. Adult mosquitoes - A. annularis, A. culicifacies and A. pulcherrimus - were collected from cowsheds of sprayed and unsprayed villages in Sheikhupura district, where DDT had been used since 1952, to find out resistance to DDT. Four concentrations of DDT - 0.25% 0.5%, 1.0%, 2.0%, were utilized for the test. The tests indicated that no resistance to DDT had developed so far.

(i) A preliminary malaria parasite survey of nomads was undertaken in winter 1957, to study the possible role of these in reintroducing malaria into the province if it is once eradicated. A total of 1,120 slides were examined from 12 localities. The percentage of positive blood slides varied from 15% in Gujrat to 0.9% in Lahore. The majority of positive blood films showed the presence of P. vivax, next was P. falciparum, while P. malariae was not found.

This preliminary survey indicates that the problem of nomadism has to be reckoned with in the planning and implementation of a future malaria eradication programme in the province.

5. PROVINCIAL ANTI-MALARIA ORGANIZATION

The anti-malaria organization is headed by a malariologist and two assistants. In each of the fifty districts, supervision and control of anti-malaria work is done by a district health officer or a civil surgeon assisted by an entomological assistant and a malaria trained sanitary Inspector at district level. The spray gangs consisting of sanitary patrols are supervised by sanitary supervisors in the district. In addition to the districts staff, there are special anti-malaria organizations for the cities of Lahore, Lyallpur, Maltan, Sargodha, Peshawar and Queta and for Malakand-Kurram agency, each under charge of a medical officer, where imagocidal as well as larvicidal measures are adopted. In all there are ten doctors, two entomologists, one assistant entomologist, twenty-three entomological assistants, 180 sanitary Inspectors and sanitary supervisors, 515 sanitary patrols (spraymen and larvicoiders), ten drivers, three mechanics and forty-three others in the province. Besides there are twenty-two laboratory assistants for laboratory work.

6. WORK DONE IN RECENT YEARS

No extensive anti-malaria campaign has been carried out in the province in recent years. Insecticidal spraying operations were executed in some hyper-endemic districts on a limited scale. The experience gained through these measures and the above described investigations provide useful material for the pre-eradication survey activities.

7. FUTURE PLANS

A malaria eradication programme is being envisaged to be implemented all over the country over the next fifteen years. Although there are many difficulties in carrying out a malaria eradication programme, it is hoped that these difficulties will be surmounted through assistance from various agencies. There is wide awakening of the people, and the great speed of development in the country is giving a priority to this eradication programme to get rid of this major health problem. The development of the Village Aid programme in the country, and the fifteen years health plan for the establishment of rural health centres will certainly help in the implementation of the future malaria eradication programme.

The village Aid Programme is intended primarily to stimulate selfhelp and cooperative effort among our villagers. It is democratic in concept and educative in nature and touches almost every phase of the daily life of the rural communities.

Similarly the 15 years health plan for the establishment of rural health centres and the development of health services in West Pakistan, under which it is hoped that for every primary centre of 40,000 population there will be a mobile unit of two doctors, (one man and the other a woman); and for each unit of 10,000 population comprising a sub-centre there will be a health technician with ancillary staff who will undertake the preventive and curative work.

The number of medical teaching institutions has increased from 1 to 6 in the West Wing of the country, and an Institute of Public Health has been established at Lahore. A malaria eradication training centre will soon be established in the province. With these increased technical education facilities the number of technical personnel of all categories will become sufficient to meet the needs of the eradication programme.

Through these developments and through the good offices of the international agencies, it is hoped that the implementation of the malaria eradication programme will be greatly facilitated.

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