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DIFFICULTIES ENCOUNTERED IN MAINTAINING TOTAL COVERAGE
DUE TO FACTORS RELATED TO PHYSICAL ENVIRONMENT OR HUMAN
CUSTOMS AND HABITS

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I. INTRODUCTION

The Malaria Eradication Programme of East Pakistan, among so many respectable relatives, has to be considered as a newly born child, having only recently entered its second year of operation. However, the experience gained up to the present is, although modest, very precious. Much longer time would be required to list all the problems encountered, or to be encountered in our activities, and still longer to prescribe the adequate therapy for their radical treatment. It must consequently be noted that in our programme the problem has been that of achieving, and not yet, of maintaining total coverage.

It will probably be useful to give here some general background notions on the environmental conditions under which our programme is proceeding.

1. Epidemiology

Broadly speaking the country can be divided epidemiologically into two areas: one where efficient vectors exist, where their density is sufficiently high, and where consequently the prevalence of malaria is severe. This applies to the north-western districts; in particular Dinajpur, to a narrow belt in the north of Mymensingh district along the Assamese foothills, and to the south-east, where the Chittagong Hill Tracts and the southern part of Chittagong district are mostly affected.

The second area includes all the low-lying territory, which is subjected to more or less severe annual floods, where no highly efficient vector species is found, and where the density of the vector present is very low. The endemicity here is at a very low level.

There is practically no intermediate area between these two. The coastal belt along the Bay of Bengal, where A. sondaicus exists, has been virtually free from malaria during the past few years. In the few foci localized along the West Bengal borders, again malaria prevalence reaches hyperendemic levels.

2. Physical Environment

The spraying operations conducted up to the present have covered only a limited territory situated in the hyperendemic area: our experience is, it must be repeated, limited to this area. It is however expected that the problems that we shall encounter during the coming years will be, for the most part, the same or similar to those which we have faced during our 1961 spraying campaign.

The houses in North Bengal are usually catcha houses, built of split bamboo, covered sometimes to a variable extent with a thin layer of mud. The proportion of true mud dwellings, which is very low in the north, increases somewhat in the southern part. Pakka houses practically exist only in towns or in the principal villages. The roofs of rural habitations are of grass, with the exception of a few prosperous homes, where the roof is of corrugated iron: the pakka houses have corrugated iron or cement roofs.

The village, as conceived in other parts of the world, does not exist in East Pakistan. What is considered as "the village" is in effect the revenue unit, which is the "moja". Usually this unit consists of a variable number of groups of houses extended in a row on stretches of elevated land, or situated in the flat and not having any concentric pattern. These groups of houses belonging to the same "village" are often situated at a considerable distance from each other. The market, which is elsewhere the focal point of the village, is usually situated here at its periphery, and very often it is found in an isolated position at a conveniently equal distance from a number of "villages"; it is then generally found deserted except in the weekly market days.

3. Population

The population of the North Bengal districts is preponderantly rural, as in the rest of the Province. The percentage of urban population is about two per cent.

Nomadism is non-existent, and movements of population comprise only a low percentage of labour moving to nearby areas at the season of harvests.

The number of population which lives outside the rural houses, i.e. in boats, etc., is exceedingly small.

The annual increase of population is slightly higher than the average for the Province, reaching 2.3 per cent. This increase is accompanied by a proportionate increase in the number of houses.

II. DIFFICULTIES ENCOUNTERED IN ACHIEVING TOTAL COVERAGE

1. Related to physical environment

As reported above, the territory covered by the 1961 spraying operations is situated in the hyperendemic area. The importance of achieving a total coverage does not need to be emphasized. It can be seen from the annexed table, which summarizes the data on the spraying activities undertaken last year, that this objective has practically been reached. According to the records only 0.19% of the existing houses were left unsprayed. This does not imply that our spraying is considered as perfect: we are well aware that the quality of this operation can be improved, and we are trying hard to raise the standard in the 1962 campaign now in operation.

The causes of experienced failure being different in the various cases, tentatively they are dealt separately in two main paragraphs: the first regarding houses not sprayed, the second houses partially or improperly sprayed.

- (a) Houses not sprayed. These include houses found closed, or unsprayed because of refusal of the owner, or simply missed.

The closed houses were routinely revisited many times during the spraying campaign, and again after its completion. They consisted mainly of shops, or of public utility buildings.

The cases of refusal reported, numbered only twenty-two out of a total of 83,787 houses: it is evident that this did not constitute, during our first year, a serious problem.*

The houses missed, which obviously are not reported in the final spraying report, are, according to our estimation, few. It can, however, be conceived that some houses, missed during the geographical reconnaissance operations, were consequently left unsprayed during the spraying campaign. No report mentions cases where houses missed by geographical reconnaissance were discovered

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In some cases the obstacle was not presented by private houses, but by religious buildings. This, in our area applies exclusively to Hindu temples. Nowhere was opposition met in spraying mosques.

during subsequent operations. Only one example of failure was reported recently from Dinajpur town, where an entire block of houses was found not numbered or mapped. This, it must be pointed out, happened in the largest town of the Zone, and the error was found and corrected during the geographical reconnaissance phase.

It must be kept in mind, however, that the problem of houses missed by the geographical reconnaissance operations will remain a threat to the achievement of total coverage, particularly in localities where houses are widely scattered in semi-jungle areas. This eventuality has been considered and a modification in geographical reconnaissance techniques already implemented this year, will partially obviate it.

The measurement of sample houses, which was in the past performed by the surveying team, will now be conducted, after the completion of geographical reconnaissance operations in a given area, by supervisors. They will be instructed to check the completeness of the work conducted by the surveying team in the selected "moja" before starting the measurement: this, in addition to their routine supervision.

New houses: The increase in the number of houses has been found to be proportionate to the increase of population. This means that every year 23 houses are added to every existing thousand. This has not constituted a problem up to the present as it has been found difficult to identify the newly constructed dwellings and include them in the spraying.

A minor problem is caused in some villages by the existence of storos, in particular those for the storage of rice, with an opening too small to permit a proper spraying of the interior. Their importance as resting places has, however, still to be demonstrated. Similarly the bamboo covers of bullock carts are usually left unsprayed when not found lying on verandas or near the houses. The same applies to the boats, which are, however, rare in the areas under operation.

- (b) Houses partially sprayed. The average size of a room in North Bengal is 3 X 4 X 3 yards; there are variations, but on the whole this standard size is amazingly constant in the entire area. The furniture usually consists of one cot, two or three trunks or cases, two shelves, several small articles hanging from the ceiling or from the walls, baskets, cooking utensils, racks, etc. It is sometimes difficult to remove, or even to displace all these articles which cause a considerable hinderance to the free movements of the spraymen: this can result in improper coverage of walls, corners and ceilings. Moreover the furniture itself cannot be properly sprayed. Another problem is caused by the

existence in many houses of double ceilings. These are represented by a more or less complete partition of bamboo mats laid horizontally at a height of three to four yards. Apart from the height of the roof in these cases, the spraymen cannot effect proper spraying of the upper surface through the small opening usually located in a corner of the room. This applies also when the partition is only partial. In other cases no double ceiling exists in human habitations, but the roofs or walls are higher than four yards; and sometimes the double ceiling itself is above this limit.

A high percentage of houses are surrounded on two or three sides by open verandas, which are usually wider in front of the house. During the hot season the dwellers, particularly those of mud houses, sleep in front of the entrance. This frontal veranda is presently being sprayed: not so the lateral wings or the eaves. The entomological findings do not indicate, up to the present, evidence of vectors resting on these surfaces, but further investigations are being conducted in order to ascertain definitely whether these surfaces need be sprayed.

The storage of agricultural products inside the houses is also a hindrance to the achievement of full coverage. This applies in particular to jute stocks, that are often stored for many months after the harvest. These goods are sprayed, but naturally when they are sold they leave an unsprayed surface. Huge baskets usually containing rice or other cereals are very often found in corners or along the walls of rooms. They can be displaced only when empty, thus the part hidden by them and the contiguous surface of walls cannot be sprayed properly. Difficulties are expected to be encountered next year in the tobacco growing zones; there the leaves are hung for drying and stocked, when dried, in houses and cowsheds. Besides the technical problem of spraying the wall and ceiling surfaces in these cases, objections will probably be raised against the contamination of crops by the insecticide. Entomological investigations will be conducted in these areas in order to ascertain whether anophelines enter or rest in these structures when the tobacco is removed.

2. Related to human factors

It must not be forgotten that the sprayman is essentially responsible for the success or failure of a spraying campaign. Of course the habits and customs of the householder, or protected human being, can influence the efficacy of an otherwise perfect coverage.

On the sprayman's side, the causes for failure can be laid to

- (a) improper technique or
- (b) carelessness.

The performance of a sprayman is not of uniform standard; some of them are excellent, some mediocre, and some inefficient or inaccurate. The majority of them work only when under strict supervision - as soon as this is relaxed they become negligent.

This applies also to their squad leaders and other supervisory personnel. It is a chain reaction, the first spark very often coming from the top. The spraying campaign is conducted here during the hottest period of the year and relaxation in supervision is too often proportionate to the level of the thermometer. This subject will not be further developed here - it applies certainly to the majority of malaria eradication projects.

On the side of the recipient, the factors influencing the achievement of total coverage can broadly be classified as related to personal behaviour or to family or community habits.

Outdoor sleeping is common both in villages and in towns (in a considerable number of cases mosquito nets are used) and some sort of protection is afforded by the spraying of house verandas. But often villagers travel at dusk or dawn, or during the entire night, in unprotected carts or boats.

Physical modifications to the sprayed surfaces include repairs, replastering, and whitewashing.

The repairing of houses, both of mud and of bamboo occurs to a certain extent during the entire year. The major repairs are, however, generally effected before the starting of the monsoon season; they coincide, therefore, with the spraying operation period. The part of the house that is commonly repaired or renewed during this season is the roof, which is, in general, completely **replaced every three or four years**. However, repairs can be effected also on walls, particularly after such events as cyclones or severe northwestern storms.

The replastering of houses does not take place at a fixed date: in the jute growing areas it is usually conducted immediately after the monsoon, in the sugar cane areas a little later, when the cane has been sold. As a general rule it is however effected before the spraying season. There are exceptions to this rule: cases have been detected of houses replastered after spraying, due to festivities, marriages, births, or financial reasons. In a few cases, and this applies particularly to Hindu houses,

all surfaces were purposely washed and replastered after the spraying. This was also detected in some governmental or para-governmental buildings (rest houses, bungalows) where the DDT was cleaned away from the better looking surfaces at the earliest occasion.

Whitewashing is not generally practised. The exceptions are the pakka houses and even in these it is not a frequent occurrence.

3. Related to other factors

A problem of high importance faced during the operations in East Pakistan is determined by the presence in the country of enclaves of foreign territory. The majority of these areas had to be left unsprayed during the 1961 campaign because of refusal by the local population. The same difficulties are expected also during the present operations. There is very little that can be done at the Programme level, besides maintaining a sprayed barrier around the enclaves until they too will achieve eradication of malaria.

III. CONCLUSIONS

As stated in the introduction, more numerous and newer problems will afflict the programme in the future, when other kinds of environment will be encountered or when the enthusiasm or tolerance of the population towards the programme will have subsided. On the other hand some of the problems enumerated above will find their practical solution with the acquisition of experience and with a better organized and more effective Health Education section.

With progress of operations the programme will shortly reach the areas where the endemicity of malaria is low. Here the danger will lie in an excessive relaxation on the part of the executive and supervisory staff. The vector species being a poor one, and its density being low, the temptation of reaching only a safe percentage in coverage will be very strong. A word of warning or alarm is still premature, but it is never too early for planning prophylactic measures against the possibility.

MALARIA ERADICATION PROGRAMME

EAST PAKISTAN

FINAL SPRAYING OPERATION REPORT

From:
24th April to 30th September 1961

ZONE No.1, 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)	1,3,4,5,6, 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	3297	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	Nil	29	Nil	35	2	Nil	Nil	47	Nil	35	82
Rooms spr.in sts.part. sprayed	508+97	Nil	2210+441	Nil	196+49	453+160	Nil	Nil	3171+698	Nil	196+49	3367+747
Surface area sprayed in sts. partially sprayed	35255	Nil	141440	Nil	12544	24915	Nil	Nil	201610	Nil	12544	214154
Structures not sprayed	80	1	62	Nil	21	2	Nil	Nil	144	Nil	22	166
(a) Un-willing	4	Nil	10	Nil	8	Nil	Nil	Nil	14	Nil	8	22
(b) Closed	74	Nil	44	Nil	13	2	Nil	Nil	120	Nil	13	133
(c) Under construction	2	1	8	Nil	Nil	Nil	Nil	Nil	10	Nil	1	11

Sector No.	1		2			3			TOTAL			G.TOTAL
Sub-Sector Nos.	2,3,4,7 & 8 (6)	1 & 5 (2)	1,3,4,5,6 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>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	490	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	506.5	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%