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1. RECENT OUTBREAK OF MALARIA IN THE COASTAL BELT OF BRITISH GUIANA

Of the total population of 580 000 in British Guiana, 450 000 live in the densely-inhabited coastal areas and the remainder in the sparsely populated large area of the Savanna and forest hinterland. The chief vector in the country used to be A. darlingi, particularly in the coastal belt, with another, at least potential, vector, A. aquasalis, also present in some areas. A total coverage DDT spray campaign in the coastal area achieved the eradication of both malaria and the vector A. darlingi. The campaign started in 1946, the results were already very marked by 1948 and by 1951 it was possible to withdraw spraying from this coastal belt. An effective, mainly passive, surveillance system has been in operation ever since in that area, mainly based on the dispensaries of the sugar estates. From 1951 until 1961 only a single case of indigenous malaria was detected in the coastal belt area (April 1955). In the hinterland, it was for various reasons impossible to break transmission by the application of residual insecticides and malaria transmission continued, the exact amount of which was hard to assess on account of the difficult accessibility to these areas. The danger of re-importation of A. darlingi into the coastal belt area from the interior had been considered to be not very serious, on account of geophysical factors; and the existing surveillance system and the continued absence of A. darlingi in the coastal plains were considered to preclude the occurrence of indigenous cases if re-importation of malaria took place.

The occurrence of a limited outbreak of malaria in the coastal plain in July-October 1961 is therefore of considerable interest. The first case was detected on 21 July near the estuary of the Demerara River, and shortly afterwards a few more cases were found in localities on both banks of the terminal stretch of that river. A thorough investigation of the whole population of that area from August to December 1961 revealed altogether 85 cases of malaria in four foci within a stretch of about 20 miles along both banks of the Demerara, the total population of that area being 24 000. All cases were P. vivax infections, with the exception of the first case which showed a mixed infection of P. vivax and P. malariae. About 54 per cent. of the cases were in persons aged 14 years and more, and 46 per cent. 14 years and under. The youngest case was in a child of three years. All cases were considered to be due to recent transmission, i.e. indigenous.

Among the 85 cases there were 81 cases with clinical symptoms and four cases without. The four symptomless parasitaemias were found at contact blood surveys. It is interesting to note that some of the cases of this outbreak (all vivax infections) had high fever and severe clinical symptoms while vivax cases observed in the interior (where malaria transmission has never been interrupted) presented only very mild symptoms.

Entomological investigations did not reveal any A. darlingi in the area, but considerable numbers of A. aquasalis were found in houses.

Origin and Causes of Transmission

In the foci of this outbreak evidence was collected of visits having taken place during the three preceding months by persons from known infected areas in the interior (Aruka River, Manganese mines). The family in which the first case was detected had had two visitors from that area for one week about a month before the onset of symptoms in the case.

A. aquasalis had been known to be still present in the coastal belt area and, while being an acknowledged potential vector, had been considered to be incapable of transmission of malaria in the coastal belt of British Guiana on account of its relatively low numbers, its exophilic habits and, most important, its diversion to cattle present in large numbers in that area. There is no doubt that the transmission in the recent outbreak was due to A. aquasalis and this is attributed to two factors, first, an unusually prolific breeding of this species during the summer of 1961, due to particularly favourable hydrographic conditions and, secondly, changes in the agricultural-ecological conditions of this area during the last few years. Expanding housing developments and expansion of rice and sugar cane cultivation with increasing mechanization have drastically reduced the number of cattle and mules in the area, and thereby driven A. aquasalis to the human population as the only, or most easily accessible source of blood.

Action Taken

With the detection of the first cases of this outbreak in July and August, energetic steps were taken to investigate the extent and causes of the outbreak through parasitological and entomological studies in the area affected (as outlined above), and to initiate appropriate remedial measures. All the affected localities were

sprayed, radical treatment was instituted in all cases found and case detection, which is already quite good, reinforced in the area. It would seem that, if these measures are strictly followed, this outbreak will be effectively controlled and the episode will not lead to a renewed spread of malaria in the coastal belt.

Conclusions

On the whole, a local limited renewal of transmission of malaria in a maintenance (or consolidation) phase area on the scale observed in British Guiana - 85 cases in a population of 24 000 of the affected area and of 450 000 of the whole maintenance phase area - is not a disastrous event, especially not if the outbreak is recognized early, investigated adequately and dealt with by effective measures, as has been the case in this instance. Certain general lessons can, however, be learned from this episode.

(1) The situation that eradication of malaria has been achieved in one part of a national territory (i.e. reached maintenance phase), while other parts of the territory are still in the attack phase or even still have uncontrolled transmission of malaria, is by no means unique in British Guiana, but a fairly frequent fact. This situation is always fraught with the danger of re-introduction of malaria from still malarious areas of the national territory, a danger which is far more important than the hypothetical one of importation of malaria from other countries. In British Guiana the situation seemed to be favourable as to the possibility of maintaining eradication in the coastal belt because of the geophysical barriers against re-introduction of A. darlingi and the relatively limited movement of population from the interior hinterland, this scattered population being very small in comparison with the population of the coastal belt. Yet, even under these favourable conditions, importation of malaria cases from the uncontrolled area has now resulted in a, fortunately limited, renewed outbreak of malaria in the maintenance phase area originating from imported cases from the interior. This shows the importance of an effective vigilance service in the maintenance phase area, such as was functioning in the case of British Guiana.

(2) It has often been postulated that the epidemiological situation in a consolidation or maintenance phase area in which this state had been reached through the eradication of the vector is less dangerous than when these states have been reached otherwise, and that therefore, in such areas, surveillance can be less strict. A recommendation to this effect has been incorporated in the Eighth Report of the Expert Committee on Malaria, in the chapter dealing with criteria for malaria eradication. The Expert

Committee, however, have already in that report drawn the attention of the reader to the fact that the proof of permanent absence of the vector may be more difficult than the proof of absence of malaria infection through surveillance, and moreover that "consideration must always be given also to the possibility that another anopheline in that area may be acting as a vector, even though it may do so only occasionally". This latter event, envisaged by the Expert Committee, has in fact taken place in the coastal belt of British Guiana where A. darlingi is still absent, but where A. aquasalis has now taken over the role of vector.

(3) Under any circumstances it is far from safe to leave uncontrolled malarious areas in a national territory for too long alongside controlled or eradicated areas. In British Guiana this fact had already been considered in 1960, and since the beginning of 1961 medicated salt distribution as the only feasible method has been instituted in the hinterland in order to achieve eradication of malaria there also. With the successful progress of this programme in the interior, the danger of a recurrence of such episodes as that of 1961 will rapidly decrease.

√ The following sources were consulted for the preparation of this note:
"Fifteen years experience in malaria eradication in British Guiana. Maintenance policies and residual problems" by Dr G. Giglioli published in the Rivista di Parasitologia (1959) Volume 20, page 279; "Recurrence of Malaria on the Demerara River Estuary, July-August 1961" an unpublished document by Dr G. Giglioli submitted to Zone I, American Region, WHO, 4 September 1961; the quarterly report for the third quarter 1961, AMRO-117, by Dr K. C. Liang, submitted to Zone I, American Region, WHO; a note entitled "The Medicated Salt Project in British Guiana" appearing in the Supplement to WHO/Mal/316 of 16 October 1961, and a memorandum from the representative Zone I, AMRO, dated 1 February 1962.√

2. THE IMPORTANCE OF SOUND ADMINISTRATION IN PLANNING AND EXECUTION OF MALARIA ERADICATION PROGRAMMES: WHO POLICY

The World Health Organization in its policies over many years past and in the resolutions adopted by its governing bodies has repeatedly stressed the fundamental importance of the role that sound administration and management practices must play in the planning and execution of public health programmes. Considerable international support has been given over the years with the objective of assisting governments - particularly in developing countries - towards a gradual strengthening and build up of their health services. Perhaps in no specific field has recognition of the importance of administrative factors been stressed more insistently than in the approach to the global malaria eradication campaign which has now been under way for several years.

Meeting in Athens in June 1956 the Expert Committee on Malaria (sixth session) stressed in its Report the absolutely fundamental necessity of sound administration in malaria eradication programmes and recommended that the greatest possible measure of attention be given to the question of efficient management:

"It has been recognized that the practicability of malaria eradication depends on management, method and money. The methods to be used have required the solution of such fascinating technical questions that relatively little attention has been paid to the problems connected with management and money, or, in other words, with administration."¹

"Direction of the scheme (malaria eradication) must be in the hands of a man of sound technical knowledge and experience in administration . . ."¹

"Efficient administrative help is needed to maintain a regular flow of supplies and equipment. The field administrative service should be under the direction of an efficient administrator with a proper understanding of the whole problem to which the malaria service is dedicated and of the possibilities and difficulties involved. Assistant clerical staff and specialized personnel for the handling of stores, supplies and maintenance shops are also required."²

The Report included a considerable number of recommendations concerning the administrative build up required to support any campaign of malaria eradication treating the questions of planning and organization in all their aspects; legislation, financing, personnel, training, throughout the various phases of a programme. This Report formed the basis for subsequent policy directives to Regional Directors of the Organization and as guiding lines for them in assisting governments to develop plans of operations.

On 29 January 1958 it was established as basic policy that:

"No programme of malaria eradication will be started with WHO assistance until complete detailed plans have been agreed between the government and WHO. A change from malaria control to malaria eradication must also be based on a plan complete in all essential details."³

¹ Wld Hlth Org. techn. Rep. Ser. 123, 19

² Wld Hlth Org. techn. Rep. Ser. 123, 25-26

³ WHO Manual Circular No. 64

As more and more countries advanced with their planning to convert their programmes from control into programmes of eradication, it became increasingly evident during 1958 that in certain countries grave deficiencies in the administrative sub-structure existed and that all-round corrective measures would need to be applied in order to enable these programmes to develop on sound technical lines.

In his Report to the Twelfth World Health Assembly in early 1959, the Director-General stated:

"A programme as extensive, ambitious, and dynamic as that of malaria eradication, based on techniques that are well known, but whose application must be planned in detail and carried out with chronological precision, requires an executive administration and a technical advisory support capable of responding to such a requirement.

Although every project has but one objective, namely malaria eradication, its operation, on a national scale, necessitates not only a large and devoted personnel, but, as a consequence of the logical diversification of activities, the advice, in every case, of well-qualified experts. In the past it was possible for malariologists and entomologists to run a control or a pilot project, in which the technical orientation was the fundamental outlook. Modern malaria eradication projects need above all people with administrative gifts, able to direct, co-ordinate, supervise and assess extensive operations, involving a large body of man-power, supplies, transportation, technical and administrative records.

Having considered this Report the Assembly adopted resolution WHA12.49 reading in part as follows:

"The Twelfth World Health Assembly . . .

appreciating that, in order to carry such a programme through to ultimate success, it is essential that there should be not only sound technical planning and direction of operations but also a high degree of efficiency in administration and organization supported by adequate legislative action; . . .

1. URGES all governments concerned to ensure that their central and peripheral services for malaria eradication are provided with adequate administrative machinery to meet the stringent demands of such time-limited programme;
2. REQUESTS the Director-General to make available, on request, to governments the requisite specialized administrative as well as technical advisory services . . ."

¹ Document A 12/P&B/10 "Report on Development of Malaria Eradication Programme (4 May 1959)."

Shortly prior to adoption of this resolution by the Assembly, the Director-General had taken steps to ensure that governments were aware of the desire of the Organization to assist them with administrative advisory services where the government so desire, and in February 1959 it was established as a general policy that all plans of operations for malaria eradication programmes would normally include the following paragraph:

"The government agrees to afford to the Organization all necessary facilities to enable the Organization to provide at its own cost administrative advice and assistance to the programme relating to the handling and distribution of supplies and equipment and any other administrative or financial question which may arise in the operations of the programme."¹

At the end of 1959, reporting to the Twenty-fifth Session of the Executive Board, the Director-General submitted a general appraisal of certain fundamental administrative and managerial aspects of the malaria eradication programme as it existed at the end of 1959. This appraisal contained the following statement:

"Finally, many governmental systems of administration are still insufficiently flexible to provide the urgent and dynamic support so vital to a programme of eradication. Some administrative reforms are being gradually introduced in a few areas, especially in relation to control and maintenance of supplies and transport, and in the field of personnel management. Although most governments are already convinced of the urgency of providing additional technical personnel to their malaria eradication programmes and of training them in the special techniques involved, the fundamental role of efficient administration has not yet been universally appreciated. The strengthening of administrative services, both as regards quality and quantity of personnel, is still widely needed. In order to assist in the solution of this problem the Organization has made available to governments the services of specially trained advisers in the administrative methods required in malaria eradication."²

Having considered this Report, the Executive Board adopted the resolution EB25.R21 which read in part as follows:

"The Executive Board . . .

3. RECOGNIZES, however, that the continuing success of the campaign depends upon adequate staffing, operational supervision and epidemiological assessment.
4. URGES governments concerned to take the necessary steps for the training and provision of adequate technical and administrative personnel required for the more effective prosecution of their eradication programme; . . ."

¹ Memorandum of 6 February 1959 from Director-General to all Regional Directors

² Document EB25/40 dated 21 December 1959 "Report on Development of Malaria Eradication Programme" page 23

Reporting¹ to the Thirteenth World Health Assembly in 1960, the Director-General again drew attention to the administrative factors impeding the development of programmes.

Having considered this Report the Assembly:

"1. URGES governments concerned to intensify their efforts for the training and provision of adequate technical and administrative personnel required to strengthen the supervisory and epidemiological assessment activities of their malaria eradication services, taking full advantage of the facilities provided by the Organization."²

During 1960 the Organization continued to make available administrative advisory services to governments requesting them and considerable stress was laid in planning and development of new programmes on the absolute need to build up the various administrative supporting services during the initial phases of operations. The Organization prepared a manual on the preparation of malaria eradication programmes (document WHO/MEM/3) in which due emphasis was placed on the essential underlying administrative support.

In reporting to the Fourteenth World Health Assembly in New Delhi in 1961 the Director-General stated:

" . . . it is also evident that a number of malaria eradication programmes have not progressed according to schedule, and that their operations have not been carried out with the required thoroughness and speed. Attention will have to be given to the improvement of the present situation and to the solution of problems which have caused failure. These have been of various types: technical, operational and administrative. Experience has shown that while it is relatively easy to find solutions to technical and operational shortcomings, it is much more difficult to correct administrative imperfections."³

Having considered this Report the Fourteenth World Health Assembly adopted resolution WHA14.2 which inter alia recognizes that in a number of projects progress continued to be impeded through administrative and operational deficiencies and urged governments:

" . . . to give full administrative and financial support to their eradication campaigns so as to ensure thoroughness and efficiency of application."

¹ Document A13/P&B/15 dated 11 April 1960 "Report on Development of Malaria Eradication Programme" page 4 et seq.

² Resolution WHA13.55 (part)

³ Document A14/P&B/2 Part I, 15 December 1960 "Report on Development of Malaria Eradication Programme" page 4

In the second half of 1960 the Expert Committee on Malaria met in Geneva and in reviewing the then present status of malaria eradication and prospects for the future drew particular attention to the chief administrative deficiencies which had caused set-backs in the development of programmes (WHO Technical Report Series No. 205, pages 8 and 9).

They also made recommendations regarding a new approach to malaria eradication in developing countries. These recommendations formed the basis of policy which was formally introduced in 1961 for the establishment of a new type of programme (pre-eradication programme). By definition this type of operation is one which is undertaken by a country with the principle objective of building up the national technical, operational and administrative foundations and facilities, where these do not exist, or are inadequate, to the level essential for ensuring the effective implementation in due time of every phase of a malaria eradication programme, including the maintenance of achieved eradication (Policy Directive, Director-General to all Regional Directors dated 16 October 1961). One of the primary objectives of such a programme would be to set up a functional scheme for the development of the technical and administrative machinery of the malaria service which could gradually grow and develop in parallel with the other pre-eradication activities until a level was reached at which the supporting administrative infra-structure could carry the full servicing functions for a malaria eradication programme proper.

The above summary of WHO policy in relation to the importance of sound administration in the planning and execution of malaria eradication programmes was compiled by Mr W. F. Beecroft, Administrative Officer of the Division of Malaria Eradication.

3. MASS COLLECTION OF POSITIVE MALARIA BLOOD SLIDES FOR TRAINING PURPOSES

The following technique is used by Mr David Payne, WHO technician at the Malaria Eradication Training Centre, Dacca, in collaboration with Major N. A. Kuraishi, Director of the Central Malaria Institute of East Pakistan, for the collection of large quantities of positive malaria blood slides which are required for training the Malaria Eradication personnel.

In a malarious area a survey is made at a village or an out-patient clinic or dispensary for persons considered to be suffering from malaria. Blood slides are made and checked on the spot by a rapid method of diagnosis (the JSB staining technique has been found very suitable for this purpose) and a selection is made of those patients demonstrating the species desired and, if required, those with the particular stage of the development of the malaria parasite wanted. From the selected patients, 10 millilitres of blood are taken by venipuncture and immediately transferred to previously prepared double oxalate tubes and transported as rapidly as possible, in a vacuum flask packed with ice, to the base laboratory where the thick and thin blood slides are prepared and stained.

The detailed technique employed is as follows:

(i) A batch of 100 double oxalate tubes are prepared by adding:

Sodium oxalate 1.2 g

Potassium oxalate 0.8 g

to 100 ml of distilled water

Pipette 1.0 ml of this solution into each of 100 culture tubes (16 x 150 mm)

Dry in a drying cabinet, plug the tubes and seal with wax.

(ii) From the patient demonstrating the species of parasite desired, 10 millilitres of venous blood are withdrawn and put into one of the double oxalate tubes. The tube is shaken gently until all the oxalate is dissolved. It is then immediately put into a vacuum flask packed with ice and dispatched to the base laboratory by the most rapid means.

(iii) As soon as possible after the arrival of the blood at the base laboratory, blood slides are prepared by placing one drop of oxalated blood on each slide, the blood in the tube being stirred continuously with a glass rod to ensure an even distribution of parasites per slide. Thick and thin films are made from the single drop, the optimum size of which is determined by trial and error. The slides are allowed to dry in the air for 12 hours.

(iv) The thick film is dehaemoglobinized for five minutes, then the slide is fixed in acetone-free methyl alcohol (Methanol) for one minute, stained with Giemsa 3.5 per cent. buffered to pH 7.35 for 45 minutes, rinsed well and allowed to dry in the air.

(v) A random selection of slides are checked and examined and, if suitable, labelled, wrapped individually in paper, and packed in bulk for later use.

Mr Payne considers that this technique offers a simple, effective method of preparing almost unlimited numbers of positive malaria blood slides for training purposes, even when relatively few positive cases are available. Collections are standard and can be arranged with a minimum of preparatory work for the instruction of students. The distribution of malaria parasites per slide seems to be fairly uniform, although in very light infections some slides may be found to be negative.

The best results are obtained when the slides are prepared within the hour, from the freshly withdrawn blood. However, slides prepared up to three hours afterwards stain quite well. Refrigerated blood - cooled in a thermos flask packed with ice or stored in a refrigerator - keeps for a longer period but, after 24 hours there is a marked deterioration in the quality of the staining.