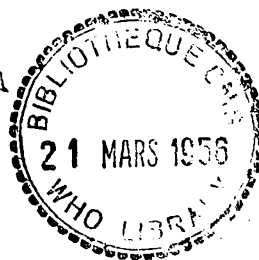


WORLD HEALTH
ORGANIZATIONINTER-REGIONAL CONFERENCE ON MALARIA
FOR EASTERN MEDITERRANEAN AND
EUROPEAN REGIONSProvisional agenda item 3.6ORGANISATION MONDIALE
DE LA SANTÉWHO/Mal/165 ✓
27 February 1956

ORIGINAL: ENGLISH

PUBLIC HEALTH POLICY IN RELATION TO
MALARIA ERADICATION PROGRAMMES

by

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The total elimination of malaria was probably first realized, for any substantial area, in the Mediterranean lands and is now becoming generally accepted as an object towards which all national control schemes should work. The process requires a constant revision of the duties and competence of staff, demanding much more flexibility in their training and management than does continued control, the cessation of spraying involves a loss of the beneficial side effects which have often been greatly appreciated, and the end of the elimination phase could mean the disbandment of a carefully constructed organization and the loss of the skill of the people in it. It would, however, be retrograde to permit this.

Public health is dynamic; it never has achieved completion in the sense that work has come to an end and it has been possible to relax without starting new programmes, and it never will. The inevitable course of any scheme for the control of disease is that it should pass through a series of phases requiring quite different mechanisms of attack and, if successful, ending in the elimination of the disease. Elimination, however, not only reveals other problems and leaves latitude in which to tackle them but it causes them. The new ones may be problems of well-being rather than adversity and ones which many poorly developed countries would gladly accept, but if neglected they would ultimately become those of adversity and would restore the position to the original. Malaria, in many countries the most important endemic or epidemic disease, is no exception; the processes of control and then of elimination and surveillance demand rapidly

changing techniques, and when they are complete will give rise to other problems which will engage the attention of public health departments as urgently as did malaria in the past. There will then be an awakened consciousness of health needs, a number of new problems, an increased awareness of old problems demanding remedy, and an organization built up to control malaria but without remaining major functions. Examination of these leads to the conclusion that the malaria elimination scheme can be progressively adapted first to deal with the phases of elimination and then to provide the mechanism for the other activities demanded of the health authority, the change from control to elimination giving the service the character of an embryo from which expanding epidemiological and environmental services can grow.

The initial phase of control consists essentially in the application of insecticides and the training and checking of staff. It requires direction by a person of very considerable administrative ability, with considerable malariological knowledge, supported by a headquarters staff specializing in entomology, parasitology and chemistry, and by a field staff of educated and trained inspectors deployed by districts and supervising the work of carefully drilled lower employees. There has naturally tended to be a central organization, within the public health department but separate from its other activities, and controlling its own central laboratory and stores, and managing the regionally distributed staff. In most countries the magnitude and importance of the task this organization faces has led to special provision of finances distinct from those laid aside for other public health activities, and this together with the division in the public health department has made the malaria service distinct from it in fact if not always in name.

The work causes considerable inconvenience to the populace and particularly the more prosperous sections of it with more numerous and more readily defaced possessions. Originally opposition was easily overcome and full co-operation secured by the demonstration of the manifest good effects of campaigns in the control of malaria and in a number of other ways. Though intended primarily to control the anopheline mosquito a malaria programme has in fact controlled a number of domestic insect pests, several of which have been more resented than the potentially dangerous anopheline. They include culicine and Aedes mosquitos, fleas, bugs, lice, Phlebotomus and others,

and through the control of these, malaria campaigns have in various parts of the world stopped the transmission of other important diseases such as dengue, yellow fever, plague, typhus, pappataci fever and leishmaniasis. In the case of the anopheline and all other insects results may be classified as sustained control, eradication, or the production of resistant strains and revival of the insect community. Public co-operation has and will depend very much on the memory of conditions before many of these were controlled, and on the extent to which the original diminution of nuisance is maintained. One or the other of these must ultimately diminish and this, together with the simple logic of the situation, must lead to the substitution of elimination programmes.

The second phase of deliberate eradication consists largely in the assessment of residual transmission, the search for cases and foci of them together with studies of their past movements and probable source of infection, and the application of curative and preventive measures to them and their surroundings. The director is asked to display different qualities from those demanded in the first phase; the administrative calls on him are lessened; the malariological appreciation needed is even greater and it must be expanded by a more general epidemiological understanding than was previously necessary. The support he requires also changes. The volume of microscopical examination of blood films is likely to increase considerably whilst entomological and chemical work decreases. The same educated and trained inspectors are needed for some time in the field, but there will be growing need for field investigations by men with a training in general epidemiology, whilst the number of labourers and men of lower skills will decrease. It is again natural that such an organization should be central and though within the department of public health it should be entirely separate from its other activities. The phase will again demand special budget provision though not necessarily on as large a scale as the previous one, and this together with the other characteristics will lead to the maintenance of an organization which is in rough outline the same as that previously employed though with many differences in detail. It will require considerable legislative support dealing with the notification of suspected cases of malaria and the rights to examine persons and to apply insecticides, and the duties of individuals to undergo

treatment when required. The inconvenience to the general public will grow progressively less as spraying is discontinued, and the possibilities of widespread objection are small. It will, however, be very important to ensure ability to examine and, if necessary, treat special individuals, and evasion by even a limited number might locally frustrate the campaign. The need to maintain public relations and to explain to the people what is being attempted and the importance that is placed upon it will, therefore, be enhanced.

During this phase spraying operations will be progressively discontinued and many of the side effects of control which have been in fact the aspects most appreciated by some people will be lost. A number of nuisance insects which had been reduced in numbers may multiply, and there is a possibility that unless they too have been eliminated the diseases which they carry, such as dengue and pappataci fever, may recur in epidemic form. Without proper explanation the recurrence of nuisance could lead to public outcry, and in any case is likely to lead to a demand for the institution of special control measures against such pests as re-establish themselves. The opportunity will then present itself for the extension of environmental sanitation directed to this end and to others less obvious, and it is perhaps at this stage that sanitation programmes could be most appropriately grafted on to and grow out of a malaria control scheme. The phase is one of progressive liberation of employees from their previous functions: first the liberation of spraying operators and later the liberation of supervisory staff who, if not already trained in the practice of sanitation, might well be drafted for such training at this period.

In the third phase of maintenance of an elimination the objects of the staff will be to study the possibilities of re-invasion, to watch for recurrence and to take active steps against either should it seem probable or actually happen. Experience in countries where elimination has been achieved shows that re-invasion and recurrence are much less likely to occur than was thought until recently, and indeed there may be periods of several years when no focus is found. The programme will involve legislation, a quarantine mechanism which will take little account of the individual but may concern itself closely with groups of people such as labourers coming from malarious areas, and a process of surveillance requiring continuous search for the

occurrence of even small foci of the disease. Pre-eminently in both its quarantine and surveillance aspects it will be a programme of constant search for something that probably never happens, or happens only at long intervals. It is inevitable that in any such programme there should be a loss of interest, then of industry and finally even of skill and competence on the part of the people concerned, only to be avoided if they are given other spheres of activity which will engage their interest so that they concern themselves in the apparently unfruitful work for only a part of their time. It is therefore essential during this stage that the special staff engaged previously on malaria control and elimination should be integrated into that of the public health department as a whole. Management in this phase will demand little special malariological knowledge but considerable application of general epidemiological technique, the demand for laboratory services will decrease so that it can be met as a part time function of laboratories designed for more general ends. Equally the need for separate financial provision in the budget will disappear, and in all ways the malaria service will ultimately become a part of the normal public health services of the country. The training which the staff has received during previous phases should, however, be of great value in other fields of that department's work, and there should be a ready transfer of individuals to other functions.

Any recrudescence is likely to be slow and heralded by the appearance of vivax malaria before that of falciparum. A first case, whether an immigrant from elsewhere or suffering from a late relapse, is likely to produce a small focus of secondary cases around him and within his own hamlet about three to five weeks after the appearance of the primary. It is only after another three to five weeks that further extension is to be feared and that dissemination over the local countryside is likely. Though individual cases may escape notice, the production of these foci is not likely to go unobserved if there is an adequate system of notification and search for cases. Discovery of a focus would be followed by energetic epidemiological inquiry into the movement of people, into possible sources of infection and places to which it might have been distributed, and to the examination of other individuals, to treatment of those found infected and inevitably to the application of insecticides to destroy infective mosquitos. There would be a considerable sense of urgency in

this and probably therefore a place for immediate insecticides, such as DDT distributed in smokes, on account of their more rapid application and less risk of production of objections on the part of the inhabitants.

The various stages of control and elimination lead to the beneficial result desired, the ending of malaria which has dominated the life of people in many countries. The effect on rates of survival is immediate and such programmes inevitably lead to a progressive enlargement of the population. There are many general implications of this which have been the subject of much discussion and controversy and are in any case beyond our special competence and outside the nature of our discipline. There are, however, several more immediate public health aspects which have received little consideration. Typically, successful control of malaria may lead to the expansion of the population at a rate of 2-2.5 per cent. per annum, which would increase the population by 22-28 per cent. in 10 years, or by 49-65 per cent. in 20 years. The first and immediate implication is that all programmes of public welfare, whether medical, environmental, educational or of a different type, must expand progressively if they are to maintain their previous relationship to the population they serve, and the greatest expansion will be needed in the field of child welfare. The second implication which may become manifest quite soon concerns the movement of people. Agricultural economies are not likely to absorb the services of greater numbers than before unless there is some simultaneous change in the agricultural pattern having this effect. Most systems of agricultural development, however, lead rather to a greater productivity by the individual and a lesser demand for personal services. It is inevitable that there should be a search for employment which many governments will meet by industrial expansion, but which will in any case lead to the movement of people towards towns, which may be expected to grow at a rate far exceeding that of the countryside as a whole. Such movement has in the past usually gone unobserved until it is brought to attention by its inevitable result - the production of expanding slums. If malaria control in the countryside is not to lead to degradation of standards of life and sanitation in the towns, public health departments must take very early account of their probable growth and ensure that it is in a healthy form. The necessary measures are principally town

planning and development in their various aspects and are not for the most part carried out by the public health authorities, but they are carried out only at the instigation of public health authorities, who are best qualified to recognize where pressures may develop and to do so before they produce squalid slums which may defy correction for decades to come. It is to be hoped that the progressive increase of population will be restrained and populations will eventually attain a balance of numbers, but in the meantime considerable growth is inevitable and could be to the serious detriment of the people if proper measures were not taken to avoid ill effects.

When these three phases of control, elimination and surveillance are examined it can be seen that they need not be discontinuous but may merge into one another and, moreover, that they can be regarded as the three initial steps which lead naturally to an expanding programme of public health. An organization which can secure elimination must in the process pass very severe tests of administrative efficiency and flexibility and of technical ability, and for these reasons alone should be a valuable continuing asset to any country. In the course of its work it will have secured the co-operation of the public and have stimulated a recognition of the meaning of health work. It will necessarily have worked on a regional structure with a central organization built up to supervise and direct it, and in this way it will have greatly strengthened local authority working, by these two mechanisms providing the essential foundation for the growth of a sound public health system. It will have created specific demands for certain types of work, notably for the control of pests or diseases which were temporarily controlled by the malaria programme, and in this way will have built up the first essential for a programme of environmental care, felt needs and expressed wants. Towards building on the foundation the organization can provide a staff which has had exceptional opportunities for the field application of epidemiological techniques, a laboratory service in contact with all parts of the country, a training mechanism and considerable numbers of men trained in specialist processes but particularly in the routine application of drilled techniques to the entire countryside of their area.

These are very material contributions which provide most of the needs of an epidemiological service responsible for the study and control of infectious diseases, and for a general programme of environmental sanitation. Through them the malaria control programme can contribute much more to the country than the elimination of malaria - great though that contribution is. The conservation of this asset demands

considerable foresight and deliberate planning of the integration of other activities with the malaria programme rather than the mere ad hoc implantation of incidental schemes as they become necessary owing to the multiplication of particular pests or nuisances.

Two important parts of a public health scheme can be built on them: an epidemiological service and a system of environmental sanitation. Certainly an epidemiological service must be continued in order to secure the maintained elimination of malaria, requiring for this purpose a staff trained in epidemiological techniques, a laboratory mechanism including parasitological and entomological services, and investigational teams adapted to field studies and the initiation of local control schemes based on their findings. By relatively small modifications this service can be made of general application and not suited solely to the control of one disease. Expansion would require some enlargement of the experience of professional staff, to be provided by study grants for training in epidemiology, the addition of a bacteriologist and a bacteriological section to the laboratory, and the further training of some of the lower staff. The laboratory would provide a background for epidemiological studies of infective disease, and would also undertake such functions as the chemical and bacteriological analysis of water and food and the control of materials and methods used by the sanitation staff, thereby providing the laboratory services required for a scheme of environmental sanitation. The epidemiology section re-organized in this way would naturally form a separate division of the public health department, in this respect perpetuating the old malaria service, and would be responsible for investigation of prevalent infective disease and for the provision of advice to both central and local authorities on their control. The professional discipline and administrative structure would be similar to those required in the later stages of the malaria elimination programme, the director of which would, in most cases, adapt himself easily to his new functions. Operation of the section would involve the employment of some field medical officers and the experience gained by the junior medical officers in the malaria elimination programme would, again, prove of the greatest value.

It has been emphasized by the Expert Committee on Environmental Sanitation in its Third Report that the essential requirements for the extension of environmental sanitation are: the creation of a public demand for improvement, health education, participation of the local authority and public in any schemes, training mechanisms for subordinate staff, a laboratory background, and the creation of a cadre of professional and technical workers, the latter having been trained in rural areas typical of the general countryside in social and hygienic standards, and by operational techniques which, for the country, are largely standardized. Most of these requirements are provided by a Malaria Control Service which can be adapted in its later stages to provide them fully.

Environmental sanitation programmes should, by preference, be developed by local authorities, receiving technical advice, supervision and where appropriate grants-in-aid from a central authority. During the malaria control programme it is inevitable that the country should have been divided into regions of operation which will for the most part either coincide with local authority areas or form a skeleton for their delineation. Staff will have for the most part been trained to operate within these areas though the amount of initiative required from the local organization has varied very much from one country to another. Where it has been small it would be desirable to pass responsibility over to the local authority as much as possible during the later stages of the programme, thereby paving the way for subsequent separate activity in environmental sanitation. One or more of these areas could be developed as a demonstration area for the development of techniques, the establishment of standards, and for the special training of staff in the manner proposed by the Expert Committee on Environmental Sanitation. The inspecting staff previously operating the malaria control scheme may already have received training in sanitation, and if not should be given one, but in either case should have worked for a time under close supervision in a demonstration area until the new techniques suitable to this process are adequately standardized. Where training schools have been established for malaria control staff they could be adapted fairly readily to the training of sanitary techniques.

The first interest in such a scheme would be the maintenance for the population of the various beneficial side-effects of the malaria control scheme, and noticeably by the control of pests of various sorts which might recur on discontinuation of spraying. From this background and particularly in relation to the control of the fly they could pass to a general conservancy mechanism appropriate to the country, and thence to the development of safe water supplies. This would, to some extent, reverse the order of events foreseen by the Environmental Sanitation Committee but the reversal might be logical and lead to a smoother transfer of activities than the order originally proposed.

A number of medical officers liberated from the malaria control scheme are not likely to be absorbed in the epidemiological service or in the business of environmental sanitation, which is not their proper concern. The proper place for these people would appear to be through a training in public health to central or local government positions as medical officers of health, and particularly to towns where the need for them will be most urgent.

It is in ways such as this that the invaluable asset of a carefully built up and efficient organization can be maintained to the public good after its original function of the control and elimination of malaria has been completed. Malaria control is the logical beginning of a general advance in the health of the public; if it is adapted in some such form as this it will be looked back on in the years to come as the beginning of a completely new era.