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IMPLEMENTATION OF DISEASE CONTROL IN ASIA AND AFRICA

PROF. M. J. COLBOURNE

F. R. C. P., F. F. C. M.

Reader, Department of Tropical Hygiene
London School of Hygiene and Tropical Medicine

Asst. Director, Ross Institute

On secondment to Department of Preventive and Social
Medicine, University of Hong Kong.

IMPLEMENTATION OF DISEASE CONTROL IN ASIA AND AFRICA

by

M. J. Colbourne F.R.C.P., F.F.C.M.

Introduction

A recent survey of the social problems of tropical countries suggested that the communicable diseases were either controlled, or that they would be of little importance within the next few years (Pearson 1969). This observation was followed by a wave of protest from scientists, whose interests lay in this field; they pointed out that the picture was much too optimistic.

In fact the control of the communicable diseases over the past few decades has been remarkably uneven. Great successes have been balanced by great disappointments. It is not easy to detect a common pattern, with so many factors concerned—the epidemiology of the disease, the technical tools for controlling it and the available resources—especially human and financial.

A brief analysis of achievements and disappointments in this field will be attempted in this paper in order to try and identify some pattern which might help the planning and implementation of control in the future. This analysis must be limited in scope and must depend to a large extent on my own work in Africa and Southeast Asia. Direct experience will be coloured by an emphasis on malaria, though examples will be drawn from other diseases such as onchocerciasis and schistosomiasis. A severe limitation will be my lack of recent

experience in India and the difficulty of obtaining comparable statistics from China; but it is hoped that these limitations may provoke some interesting discussion.

Recent Progress

In summarising the progress made in controlling communicable disease in recent years, we may consider the nature of transmission—contact, oro-faecal, or arthropod-borne; the social setting—whether urban or rural; and the principle method of control—the elimination of the reservoir, the interruption of the route of transmission or the protection of susceptibles. Comparison of the characteristics in success and in failure, may give some hints for control.

One of the most striking successes has been the control and near, though not complete, eradication of yaws—a rural disease—by mass unipurpose campaigns relying on penicillin. On the other hand the predominantly urban venereal diseases are increasing in most countries of the world though they might seem to be equally controllable by the same antibiotic. Social factors are obviously important here. Two other diseases of close contact, tuberculosis and leprosy, have been well controlled over wide areas, mainly by the treatment of the patient and emptying of the reservoir, though B.C.G. has increased immunity to tuberculosis—and perhaps also to leprosy. Dr. Stanley Browne (1972) has discussed the types of service appropriate for controlling leprosy showing, incidentally, that the specialist need not be narrow minded. Another success by unipurpose teams has been the control and, we hope, soon-to-be achieved eradication of smallpox by vaccination. This has depended largely on an effective vaccine but the efficient organisation of coverage and follow up is probably equally important. This success has again been against a disease of rural areas. In the arthropod borne disease progress

has been chequered. The greatly publicised malarial eradication programme has achieved some complete successes, many partial successes—with great benefit to health—some major set-backs as in Sri Lanka, and, in some areas of tropical Africa, has made no progress at all. There should be something to be learnt by comparing this campaign with that against smallpox.

Filariasis will be dealt with by Dr. Hawking, again there are successes and failures—a great reduction in the Pacific Islands largely by drug treatment, but resurgence in many tropical cities, such as Rangoon. It is too soon to forecast the results of the major campaign against onchocerciasis in West Africa. Recent years have seen the appearance of a new arthropod borne disease—haemorrhagic dengue fever—in some of the cities of South East Asia. It is perplexing that this is now the most important of the arthropod borne diseases in Singapore—a city renowned for its successful campaign for urban cleanliness.

Poor progress has been made against the diseases of insanitation. It is discouraging but instructive to read the reports of the hookworm eradication campaign promoted by the Rockefeller Foundation before the 1914 war (Beaver 1961). Everyone knows that hookworms still flourish in most rural areas and many towns. The recent spread of cholera through Asia to Africa is only too well known. The spread of schistosomiasis in many parts of Africa in spite of every effort to improve treatment of the patient and control of the vector is disturbing. However in spite of this gloomy picture of the progress against the diseases of insanitation, the health of children has certainly improved. Wherever simple but effective clinics for infant welfare have been set up there has been a great decrease in infant mortality due to gastro-intestinal disease. Much of this improvement

seems to have been the result of quite straight-forward advice to the mother. Many of the childhood infections have been well controlled by immunizations given as part of the child health service. Here only a brief and incomplete summary of the progress of the control of communicable disease is possible. WHO often provides more complete reports (WHO 1973). This summary is probably sufficient to show that progress is uneven and that much remains to be done.

The failures have been expensive in money and manpower. If they could have been foreseen, the resources could have been better used in other fields. Can we learn from these successes and set-backs how to avoid wasteful campaigns? At the same time we must not become so cautious that promising opportunities for control are missed. *Tout savoir est rien faire.*

It is clear that there is no simple answer why some have succeeded and why others have failed. Urban and rural, unipurpose campaigns and those coordinated into the general public health service, treatment of patient and control of environment, each has had success and failure. Success in the control of the same disease has varied to some extent from one country to another; this could be due, either to a different reproduction rate of the disease or to a different standard of control. On the whole, success in one place has been repeated in most others where the endemicity has been similar. It is clear that we must look further for indications that will help us to forecast success.

The need for the control of a communicable disease is usually self-evident. It is more difficult to decide whether the benefits obtained will be commensurate with the resources invested, in the face of many competing priorities. The cost and effectiveness of several aspects of control have to be considered.

First there is the control measure that is to be used, which may be single and simple or multiple and complex. Secondly there is an understanding of the epidemiology of the disease, which should give some indication of how difficult control will be. Thirdly is the practical implementation of the control method in the field; the factors involved are complex and much less easily measured, but on them depends the prospects for success. Even to enter the third stage depends on obtaining financial and political support.

The Method of Control

Non-specific improvements in the environment have certainly been responsible for the control of some communicable disease, the resettlement of squatters in high rise flats in Singapore controlled the transmission of soil transmitted helminths (Kleevens 1972).

More frequently the control of a communicable disease has been due to a specific technical advance. This may have been of great simplicity — the introduction of the bifurcated needle as an efficient and economical tool, together with a stable effective vaccine, in the control of smallpox. It may have been from a discovery not made specifically to control one disease but as an unexpected “fall-out”, as the success of penicillin in the control of yaws. Often the weapon is sought at great cost and effort in order to solve a particular problem, an example is the search for drugs and molluscicides to control schistosomiasis. In such cases the research is often carried out by private concerns which must have some prospect of getting a reasonable return on their investment. Here is a difficulty — unless there is such a prospect there is no stimulus for further research; but if the final product is too expensive, widescale implementation of control may not be possible. As well as the

tools for control, research to improve the techniques and materials for diagnosis and assessment is also required.

One has the impression that research work in the laboratory and, to some extent, the testing of control and diagnostic tools in the field, are considered appropriate work for the scientific method and that the best brains are attracted to this work. The problems of implementation in the field are more diffuse and less attractive to the "hard" scientist. One is reminded of the Dictator Sulla, who, when he restored the Roman constitution, said, before he returned to a life of ease and luxury in his country villa: "I have put the Senate into the saddle, let us see if it can ride". It soon fell out of the saddle again.

In 1964 Macfarlane Burnet hoped that the best brains working in medicine would consider that research into molecular biology had gone far enough and that a great future lay in the development of the behavioural sciences. Implementation of control in the field as well as improved provision of medical care certainly needs their help.

Quantitative Epidemiology

During the past two decades the quantitative aspects of epidemiology have been developed, stimulated to a great extent by the work of Macdonald (1973), primarily in malaria but also in the fields of schistosomiasis and filariasis. The objective is straight forward. Measurement of the reproduction rate of a disease in a particular situation compared with the degree of reduction in this rate that the available control method or methods can achieve in the field should give an accurate forecast of the success possible. In fact this degree of accuracy has not yet been reached, the measurement in the field of the various factors has proved difficult. Some of the

basic values are extremely hard to collect. In malaria for example the number of days in which an untreated human host is infective to the vector must be known. There are few observations on which this can be based and it would be ethically difficult to repeat them (Earle *et al* 1939). The practical value of the quantitative approach has, so far, turned out to be largely qualitative. Situations in which there is a "governor mechanism" will be hard to control. Examples are: the reduction of malaria gametocytaemia as immunity increases, and vice versa; on the other hand study of schistosomiasis suggests that intensification of control measures may suddenly produce a "break-point" with a rapid interruption of transmission even though the same measures, slightly less rigorously applied, have had little effect. Forecasts of what would occur from the quantitative data available have been less successful. Addition of drugs to insecticides in a campaign to interrupt the transmission of malaria in Northern Nigeria did not achieve the expected results. (Macdonald *et al*, 1968).

Quantitative epidemiology is being extended to other diseases. The technical difficulty of the mathematics has resulted in many epidemiologists being unable to develop these methods themselves but if the mathematician and the epidemiologist can together produce a practical model, there will be a great improvement in the ability to forecast the success of control.

Control in the Field

Once it appears that there is a good case for a new or improved attack on a communicable disease, planning for implementation takes place, including not only comparatively straight forward technical planning and training but also the more diffuse fund-raising and soliciting support and co-operation. The qualities to carry this out successfully are not necessarily possessed by the

intellectual research worker. The protagonist of the control method may have to "sell" his idea in order to get the men, money and materials to implement the project. He has to argue for support for his ideas in the face of counter-claims from other users of scarce resources or even for the continuation of the previous methods of control. He has to abandon the attitude of the scientist for that of the advocate. If he does not "oversell" his idea he may see rival schemes, which he believes to be inferior, receive priority.

This change of attitude may have dangerous implications. Objectivity may be lost, there becomes a vested interest in keeping the project going. The continuation of the scheme may be necessary for the reputation and positions both of the proposer and of the supporters he has won to his side.

There is a serious dilemma once the project is in operation. Large scale projects depend on the enthusiasm of the staff and the public to keep them going. On the other hand if the scientist loses the habit of self-criticism, he abandons the quality which justifies his position as an expert. A demand for "faith" from sceptics is often dangerous; it suggests that natural law must be waived for the project to succeed. This is unlikely to happen.

This aspect of the implementation of control is very broad and has many implications including the political. It would be an advantage to separate the scientific preparatory work from the decision making and the implementation; in large well organised situations this may be possible, but often the same individual is involved in all three, especially in some developing countries where there is a shortage of skilled staff and where communicable diseases are still the major health problem.

When the decision has been made to undertake control, the organisation of the project must be determined. The two extremes are the single purpose vertical project aimed at the control of a single disease and the incorporation of the project into the work of the horizontal basic health service. The latter method is the one most generally recommended nowadays on the grounds that control carried out by the unipurpose organisation will eventually have to be maintained by the basic health services and that the development of too many special units is wasteful of manpower. Though it is admitted that in an emergency the unipurpose vertical project will produce results more quickly.

The multiplication of vertical units can be carried to extremes. A few years ago I visited an Asian country as part of a malaria eradication assessment team. We were introduced to a senior official by the WHO representative; we emphasised the importance of keeping the large force of case detection workers in the field to maintain what had been won. At the end of the meeting the WHO representative took the opportunity of pressing for the implementation of the smallpox eradication programme with its own, independent team of field workers. The walls of the senior official's office were covered with charts showing the organisation of the family planning service which was another independent service at that time receiving priority from the government. When the team visited the field we found that the basic health services was undersupplied and understaffed. The malaria eradication service and the family planning service, on the other hand, were well organised and efficient though the agents of each service were spending much time in travelling from house to house and comparatively little in actual contact with the people they were visiting.

Partly because of the large share of limited resources being deviated to the special services and partly because of the low status and reward for service in the field as compared with urban practice, especially hospital practice, the basic public health service was at a low ebb. This unpopularity of rural health work is perhaps more fundamental than the issue between multipurpose and unipurpose projects.

The success of some campaigns, relying on field teams dealing with one disease such as smallpox prevention and yaws treatment show that it is unwise to be too dogmatic. They are certainly attractive to the specialist who feels that his campaign can be pressed home without being diluted by the other responsibilities of the generalist.

The campaigns that demand continuing routine work month after month in the same area with little to show for it, such as the consolidation phase of malaria eradication, are difficult to keep going and very hard to supervise. Certainly many current systems of training medical students makes the recent medical graduate particularly unsuitable for this type of supervision; though he is often given this work as part of his service to the community after graduation. He feels his training in personal care is being wasted and that he is untrained for supervisory field work.

This problem together with the tricky question of the use of medical auxiliaries must be taken into account when trying to find the best local solution for the staffing of control teams in the field.

So far this review of the factors that have to be taken into account in analysing schemes to control communicable disease has not given any hint of any general

rule that might assist planning in the future. Some projects have succeeded, whereas others, apparently in a similar epidemiological situation, have been unsuccessful. In the same way sometimes one type of organisation has been successful and sometimes another. This may be the most useful hint we have obtained.

Southgate and Heisch (1966) attacked the "Utopian" approach to the solution of health problems in developing countries. They were rightly suspicious of holistic solutions to complex human situations. They also pointed out the faults of the too "practical" approach by the man who wants "to get on with the job" with the tools immediately available. Such efforts are often piecemeal, unco-ordinated and wasteful. They recommended a road between these extreme positions. "The general medical and health services which are needed to meet the long term requirements of developing countries can be built up, while making use of the enthusiastic specialists without whom it will be impossible to solve the complex technical problems that loom ahead." This middle way they termed "co-operative pluralism".

This type of approach may help avoid some failures in disease control. The independent programmes must be fitted into the basic health service. The basic health service must accept the realities of control programmes already in operation. It is not uncommon to find those who are planning health services so insistent on the educational standards required for entry — often based on inappropriate criteria from other countries — that they will not accept the possibility of employing permanently staff with lower basic education who are already successfully employed in disease control programmes. This is part of the "holistic" or "utopian" approach. It wastes good men

and endangers the control programme by lowering morale.

The difficulties of the implementation of control programmes in developing countries has tended to become overshadowed by the arguments between the protagonists of the unipurpose campaign and the complete reliance on the development of the basic health service. Payne (1968) discussing the control of tuberculosis, has pointed out that it is erroneous to believe that the "horizontal" and "vertical" approaches are mutually exclusive. He considers that the purely vertical programme should be considered as an emergency measure and that for a long lasting impact horizontal development is essential.

If we accept that overemphasis has been placed on this controversy, we must try and identify the other important practical impediments to success. Some of these have been indicated above. Success is more likely if the local problems are identified locally and an attempt is made to solve them without trying to find some "general case" which will provide a pattern for success everywhere. This is in fact the "co-operative pluralism" of Southgate and Heisch, though some may object to the actual term as obscure similar to the "holistic" jargon to which they objected.

If we accept, that, for long term results, there is a need for control projects to be based on a general health service which is developed in accordance with the local resources, what is the position of the specialist in the control of the specific communicable diseases?

It is suggested that he will put forward the case for control but that he should do this as a scientist and not as an advocate. His reputation and position should not necessarily be dependent on the results of the project in

the field. He should take part in the planning of the project and remain firm on the technical requirements. If he gets involved in staffing and financial problems he will be tempted to compromise what is essential. (Though if a horizontal programme follows a vertical one, he may have to fight for permanent positions for his staff.)

If, however, he remains unresponsive to reasonable suggestions from administrators and demands too wide a safety margin, he may never see his project get off the ground. He must not remain entirely aloof from the planning of the organisation of the project; he must be aware of the newer techniques of operational research such as Programme Evaluation and Review Techniques and Critical Path Methods. The "hard" scientist sometimes sneers at these attempts to introduce system into what was previously often decided by instinct. They might remember that not long ago the classicists regarded the natural scientists as hardly respectable. An interesting but complicated resource allocation model for tuberculosis control has recently been produced by Feldstein and his colleagues (1973).

During the operation of the project it would be better if the specialist becomes responsible not for execution but for assessment, certainly technical and probably also operational. He must be aware that assessment is not always an obvious requirement especially to some politicians. Some ask "Why assess the pianist? He is doing his best." They feel that once the programme has been decided on, critical comments will only dampen enthusiasm. Here there can be no compromise. Shortcomings must be detected, accepted and corrected. It is better if this is done willingly, otherwise it will be forced from outside.

Even the brief summary possible here has shown striking differences between the results of schemes to control communicable diseases, suggesting that a more complete analysis might give useful hints for further planning. It should be possible to distinguish projects in which unsatisfactory progress has been due to a technical method which was not sufficiently effective from those in which a satisfactory method has been inefficiently applied. Though it must be admitted that, in the field, the identification of the exact point of failure is not always easy. This doubt may be resolved if current assessment of the project is well planned and carried out.

There is still plenty of scope for the scientist specialising in the control of communicable disease in searching for better control, for better methods of assessment and for a more complete understanding of the epidemiology of those diseases where the available control methods are not sufficiently effective.

Where less than satisfactory results seem to have been due to poor implementation, operational research aiming at finding the best local solution should improve the prospects of successful control. To some of us the methods in this relatively new field may seem imprecise. This seems unavoidable with the complicated issues involved in deciding on health priorities and in providing the service for carrying them out.

There do seem to be two disciplines concerned in implementing control schemes, co-ordination of their effects seems essential for complete success.

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