The Control of Disease in the Tropics

A Handbook for Medical Practitioners

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PREFACE

MOST text-books on the subject of disease in the tropics have been written from the clinical point of view and deal only briefly with the important problems of prevention and control. Text-books on public health are largely urban in outlook and devote comparatively little attention to the problems of disease as they exist in under-developed rural areas which form the major part of the tropics. They are therefore not of great practical use to the medical practitioner with public health responsibilities in these parts. It is for him that this book is intended. A great deal of valuable information on these matters is, however, to be found scattered about in various publications or in monographs on individual diseases. It has been our aim to bring together the more essential parts of this within the compass of a handbook of convenient size, and no attempt has been made to produce a comprehensive volume dealing with every aspect of public health in the tropics. The selection of the material has presented a difficult problem and, due to considerations of space, much has had to be omitted which some may feel should have been included.

In general, the book is based on the lectures on the subject given at the Liverpool School of Tropical Medicine. The diseases dealt with have been selected mainly on the grounds either that they are extensively endemic and of considerable economic importance or because they have serious epidemic potentialities. Some have been omitted because they are of relatively little general public health importance and others because there are as yet no practical measures of control available. They are arranged as far as possible in groups according to the mode of transmission and the circumstances which govern man's exposure to infection, since these factors largely determine the control measures which can be applied.

The chapters on sanitation are confined to simple methods and procedures which are considered applicable in the conditions which prevail over the greater part of the rural tropics. Information and techniques of use in the application of the control measures recommended are included in an Appendix.

We owe a great debt of gratitude to many people, but particularly to all those who have worked in the tropics and whose published and unpublished work has made the writing of this book possible. We are also very grateful to Dr. T. A. Austin, Mr. E. Mills, Dr. G. Stuart and Dr.

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CHAPTER I

ECONOMIC AND SOCIAL ASPECTS OF DISEASE

THE science of preventive medicine is now being directed more and more towards a study of the relationship between man and his environment, and it is becoming increasingly evident that the ultimate elimination of disease must depend on an adjustment between them. This adjustment can be effected in two ways—either man must alter his way of living to suit his environment or he must modify his environment to suit his way of living. The final answer will probably involve a measure of both. The ultimate objective must be the creation of conditions of living in which disease cannot survive. These conditions can be brought about only by co-ordinated progress in economic, cultural and social spheres leading to a better pattern of living, and since the process is an evolutionary one it must be watched and guided if the final result is to be an integrated whole.

Epidemiological studies reveal the fact that relatively few of those diseases which are commonly referred to as 'tropical' are confined to the tropics for purely climatic reasons. Some of these diseases were at one time prevalent in the temperate zones but are now unknown there, while others only appear occasionally and in exceptional circumstances. The epidemiologist was thus faced with the problem of why disease should be prevalent in one place and should disappear, apparently spontaneously, from another. It was soon apparent that these facts could not be explained on ætiological grounds alone and the evidence pointed to changes in man's physical and social environment as major factors accounting for them. Physical environment, and in particular 'sanitary' environment, has for long been recognised as having a profound influence on health, and this will be considered later in its appropriate contexts, but it is only comparatively recently that the importance of social environment, in regard to health, has received due recognition.

It is now accepted that many components go to the maintenance of health, prominent among these being sufficient food of the proper variety and quality, domestic stability and social security. To provide these it is necessary to employ instruments of social and economic policy which lie outside the legitimate sphere of action of the medical profession. Those concerned with hygiene, however, cannot disregard them, although for practical purposes they must impose limits on their

professional interest in them. Nutritional standards, for example, are chiefly related to income levels and educational status, and these in turn depend on social and economic policies. An infant may die, as many do in the tropics, from an acute gastro-enteritis, the immediate cause of which is a bacterial infection. Infection is the most obvious link in the chain of pathological changes initiated in the child and ending in death, but preceding that infection there is often a long chain of related circumstances—premature weaning, mismanaged artificial feeding, an ignorant mother, a poor home and a whole family living in abject poverty—which may be more important in determining the end-result than the actual infection.

While medical science has played its part in the control of disease, the major factors have undoubtedly been the raising of economic, social and cultural levels. A study of the decline in communicable disease in the wealthier communities of the world shows that it commenced long before the true nature of communicable disease was understood. The decline of these diseases in Europe and North America has been paralleled in the past fifty years in connection with tuberculosis in Hawaii and has demonstrated that the same principles apply also in the tropics. At the beginning of this century the tuberculosis death rate in Hawaii was 500 per 100,000, and a determined attack on the disease was made by improving living conditions. As a result, its incidence steadily diminished. It was not until some thirty years later that specific preventive measures were undertaken, these being assisted in recent years by modern therapy, so that in 1953 the tuberculosis death rate had fallen to 11 per 100,000. Medical preventive measures were thus something superimposed on a solid foundation of social and economic advancement which in itself had already gone a long way towards controlling the disease and without which it is doubtful whether they would have succeeded as they did.

The decline of communicable disease in the more educated and wealthier countries followed this pattern because, as they advanced in culture, they demanded such sanitary amenities as pure water supplies, safe disposal of human wastes and adequate housing, and they could afford to live in conditions which reduced the degree of contact between members of the community and disease-producing agents. A minimum standard of living for all members of the community was accepted by public opinion and was enforced by legislation governing working conditions and wages, housing, environmental sanitation and control of communicable disease; and by instruments of social welfare such as free education, free medical treatment, old age pensions, unemployment benefit and financial help for those in need.

The history of the recession of communicable disease in advanced countries has important lessons for those concerned in promoting the

health of tropical peoples. Highly efficient and relatively inexpensive techniques are now available for the control and treatment of many of the common tropical infections, and there has been a tendency to use them without ensuring simultaneous social and economic progress. Medical science alone cannot eliminate ill-health and disease from a community, for although medical techniques may reduce the burden of disease, they are in most cases only palliative and must be continued indefinitely since they do not strike at the root of the evil.

Poverty and the diseases with which it is associated can be abolished only by a long-term policy of education and economic advancement resulting in better standards of living. The campaign to improve conditions of life requires the combined efforts of agriculturists, educationists, doctors, engineers, economists and others, and their efforts must be integrated in such a way that development is balanced and continuous, since otherwise it may give rise merely to new and even more serious problems.

One of the major obstacles to advancement lies in the fact that economic levels determine the size and scope of the social services which can be provided. The average per capita income and the proportion of it which can be collected as revenue in tropical countries is only a small fraction of that in the industrialised countries, and therefore comparable services cannot be provided. It is regrettable that for various reasons the medical services in the tropics have been based on a modification of those employed in more highly industrialised countries, the main emphasis tending to be on cure rather than prevention. Even a cursory inspection of the average hospital in the tropics will reveal the large number of beds which are occupied by cases of preventable disease. This indicates inadequacy of the public health services, yet in some areas the annual expenditure per head of population on the public health is less than that required to maintain one person in hospital for one day. Hospitals are expensive institutions to maintain, and it is probable that few tropical countries will be able, in the foreseeable future, to afford the ratio of hospital beds to population which is now considered desirable in wealthier communities. A vigorous policy of prevention is therefore required to enable them to make the best use of the limited hospital accommodation which they are likely to be able to afford. A further powerful argument in favour of such a policy is the economic benefit to the country which results from the prevention of disabling disease rather than the treatment of individual sufferers. Moreover, in the tropics where communicable disease constitutes the main medical problem, hospital services cannot materially affect the general incidence of these, whereas campaigns designed to prevent disease can significantly and often dramatically reduce morbidity and mortality rates. Fortunately, the cost of a public health service is very

much less than that of a comprehensive medical organisation and can therefore be afforded by communities for whom an extensive hospital service would be too costly.

In many cases, faulty habits of living are important factors in maintaining disease in a community. Low economic and social levels are associated with apathy, ignorance and low standards of personal hygiene. Our most deeply ingrained habits are those acquired in childhood, and ignorant mothers with bad and dirty habits result in children growing up with these same habits. So it will go on until people adopt better ways of living and are brought to realise that insanitary behaviour results in ill-health. A system for disposal of human excreta, no matter how well planned, will not succeed so long as individuals continue to see no evil in indiscriminate defæcation in the vicinity of their dwellings. Low standards of personal hygiene are reflected in low standards of public hygiene, and efforts to raise the latter will have little effect if the former remain low. The process of acquiring better habits can be speeded up by the education of women in particular, and much can be done through welfare centres and women's institutes, where they can receive instruction in the principles of hygiene, mothercraft and better ways of living. Instruction in the home by health visitors is a continuation of this form of education.

It is of the utmost importance that every public health scheme should be associated with health education, for it is only when people are convinced that their faulty ways of living perpetuate disease that they will co-operate actively in improving their surroundings. When this stage has been reached, a permanent advance will have been made. Assistance will then be welcomed and further advances can be consolidated step by step. The people will realise that the new way of living is not imposed on them from above, but is something which they themselves have had a part in creating and from which they benefit. The necessity for active co-operation on the part of the community requires to be emphasised here because certain public health techniques now commonly employed, such as the control of vector-borne disease by means of residual insecticides, require at the most only passive acceptance and demand a minimum of active help from the community. These measures effectively reduce or abolish disease, but they have little if any educational value since the people have taken no active part in them.

A programme of fundamental education designed to help people to help themselves is one of the most successful ways of raising standards of living. All important environmental conditions come within its scope, and self-help schemes of various kinds can be started. These schemes have an important cultural influence because they are educational and they develop initiative, co-operation and a sense of respon-

sibility in those who participate in them. Specially important are programmes connected with agriculture, housing and sanitation. Public health activities which are suitable for self-help schemes are, for example, the construction of protected wells, protection of springs, composting of wastes and construction of houses of better design. With assistance and supervision improvements can be effected in all of these, and since they have been carried out at the wish and by the labour of the people themselves they will be valued. Before any decision is made as to the object of the community's activities, public opinion should be consulted about a number of improvements needed locally, and these should be widely discussed. The people should then be led to select the objective which is most necessary and desirable. Co-operation in the programme will be facilitated by forming a committee of locally influential people who will lead the community and be responsible for organising the work and explaining its purpose and value. It should be noted that the standards set should be reasonably possible of attainment by a poor and uneducated community, and the type and construction and method of usage must be related to local social, educational and economic levels. Large-scale, forceful development schemes imposed on a population from outside have often failed in the past. Real development must be for the people and achieved through the people if it is to be a stable advance and bring the benefits hoped for.

The basic activity of a health service must therefore be education, for only by persuading the people to change their faulty habits of living will a healthier environment be achieved. One great difficulty in bringing this about is that the tropical peasant has his own theories of the causation of disease, which he attributes to unfriendly spirits, magic and similar agencies. He has to be convinced that the real agents of disease are physical things, even though invisible to the naked eye, which spread from man to man by specific routes, and it is far from easy to convince him of this and to persuade him to act accordingly. Until he does so he will continue to live in an unhygienic manner and will misuse sanitary installations and equipment which have been provided for him. When, however, he has been convinced, progress can be accelerated by employing all suitable modern public health techniques.

Emphasis has been laid on the necessity for ensuring that development schemes are broadly based and cover all important aspects of human activity. It is worthy of note that narrowly based schemes lead to unbalanced progress and are liable to cause grave problems. For example, economic development without education leads to money being squandered on things which often are of no benefit, while vocational education, which is at present restricted to a few, produces a politically disaffected section of society if opportunities to use it for personal gain are not provided, since it is not understood that such

education does not confer a privilege but should engender a sense of service to the community. Similarly, if disease control is not kept in step with educational and economic advances, the tropical community is likely to remain on or revert to a low standard of living and be exposed to the disease-producing effects of poverty. Where public health outstrips progress in other fields, there is a grave danger of causing a rapid increase of population by creating a marked imbalance between births and deaths. In the less advanced territories, birth rates are high and the rate of population expansion is controlled mainly by a high death rate due, for the most part, to preventable disease. Modern public health techniques can in many cases reduce mortality by as much as half in a few years and may even increase fertility. So long as land is available for settlement, or cultivation of existing land can be intensified, the increasing numbers can be accommodated and the people will benefit, but where all land is already in use, population expansion will cause standards of living to fall and the death rate will begin to rise again as poverty increases. To meet this situation, two measures are necessary: food production must be increased by intensifying cultivation, and employment must be created for those who can no longer be accommodated on the land. Unfortunately, both these measures can be introduced only slowly, for peasants are reluctant to change traditional farming practices, and the creation of employment requires the investment of large funds, which are difficult to obtain in under-developed communities. Moreover, increased food production and similar means of meeting the situation, such as migration, are only palliative measures which, if unaccompanied by improved standards of living, will inevitably become increasingly ineffective as the population continues to grow.

The only sound solution for the problem of over-population appears to lie in reducing fertility so that the birth rate approximates to the death rate. This may be brought about by a co-ordinated scheme of development such as has already been suggested for the relief of poverty. As living standards rise, the people begin to acquire possessions and to desire others; expenditure on food, education and other things required by children increases until the desire to maintain a raised standard of living comes into conflict with those needs. At this point a wish to limit the family arises. Other factors tending to reduce fertility are associated with urbanisation and industrialisation. These operate by substituting a wage economy for a peasant subsistence economy, which increases economic pressure on the family group; education of children and apprenticeship in industry tend to delay the age of marriage; the employment of girls as wage-earners has the same effect, since they add their earnings to the family purse and the parents are therefore less anxious to hasten their marriage. In a society steadily advancing in

culture and wealth, all the factors referred to above combine to reduce fertility while at the same time the expectation of life is lengthened, so that after several generations the fertility pattern and population structure begin to resemble those of a western industrialised country. Population pressure then steadily decreases as a result of the simultaneous development of the country's resources and the progressive decline in the excess of births over deaths.

The growing world population can only be assured of its food supplies provided every means and possibility of land betterment and improved farming methods are exploited to the full. Perfection of agricultural methods will then eventually displace agricultural workers, and most countries will want fewer farmers and not more. Work must then be found for the surplus population. Most governments see the pattern of progress and development, at least in part, as a shift from primary production to industrialisation. A study of the occupational structure of an industrialised country shows that there are three main divisions: those who win wealth directly from the soil, those engaged in manufacture, and those who render services in the broad sense of the word (e.g. commerce, transport, the professions, administrators, teachers, foremen, technicians and others). The most advanced and wealthiest industrialised countries have the highest proportion of their working population in this third class despite the fact that visible production comes from the other two. In the under-developed territories of the tropics where nine-tenths or more of the population are engaged in primitive agriculture, neither industries nor services can be developed immediately and effectively, and if there is no change in occupational structure any additional population can only further overcrowd the land. A change to industrialisation cannot therefore be made by the stroke of a pen, for in these countries where are the managers, technicians, engineers and foremen to come from? The speed at which a country can be industrialised in order to raise standards of living must therefore depend and, indeed, wait on the educational programme. Other factors which limit this process are the matter of equipment and capital, and the rate at which they can be accumulated in a poor country. Power is also essential to industrialisation, for basic industries such as iron, steel and chemicals are only found in regions possessing abundant sources of power together with the necessary raw materials. Industrialisation in turn leads to the growth of cities and this raises further problems, not the least of which is the adaptation of an essentially rural population to an urban existence with the change in social structure which this implies.