

# HEALTH ECONOMICS

Report on a WHO Interregional Seminar

*This report is a summary of views expressed at the interregional seminar and does not necessarily represent the decisions or the stated policy of the World Health Organization.*



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## CONTENTS

	Page
Preface . . . . .	7
1. General considerations . . . . .	9
Introduction . . . . .	9
The aim of health economics . . . . .	9
Why health economics? . . . . .	11
2. Macro aspects of health economics . . . . .	13
Overview of costs of health and health services . . . . .	13
Costs, concepts and trends . . . . .	13
Reasons for cost trends . . . . .	15
Some examples of ways of containing health service costs . . . . .	16
Monitoring costs: problems of cost accounting . . . . .	18
Overall health service benefits . . . . .	18
Benefits in terms of satisfaction of health needs . . . . .	18
Health services as consumption and investment . . . . .	20
Direct economic development benefits of health services . . . . .	20
Economic development benefits of improved health status . . . . .	21
Health service benefits in terms of social development . . . . .	22
Health service benefits in terms of savings . . . . .	23
The aggregation of health service benefits . . . . .	23
Some additional issues for health service planning . . . . .	23

	page
<b>3. Micro aspects of health economics</b> . . . . .	<b>25</b>
Relevance of the production function concept to the delivery of health services . . . . .	25
The effectiveness of health services . . . . .	26
Major components of the production function in the health sector: a study of pharmaceuticals as a case in point . . . . .	27
The use of incentives for promoting the efficiency of health services . . . . .	28
The role of incentives in health services . . . . .	28
Incentives for the geographical redistribution of trained health manpower . . . . .	29
Incentives related to physician payment and health insurance . . . . .	30
Evaluation of health service programmes . . . . .	31
Cost/benefit and cost/effectiveness analyses as tools of evaluation . . . . .	31
Evaluation of medical care programmes . . . . .	31
The evaluation of other health service programmes . . . . .	32
<b>4. Conclusions and recommendations</b> . . . . .	<b>36</b>
Action within countries . . . . .	36
Action by the Organization . . . . .	37
<b>Bibliography</b> . . . . .	<b>38</b>
<b>Participants</b> . . . . .	<b>43</b>

## PREFACE

*From its inception, the World Health Organization has been conscious of the importance of the economic manifestations of ill-health and disease, of the financial limitations that so often restrict the provision or procurement of adequate medical and health care, and of the difficulties besetting the assessment of benefits resulting from such care, in monetary terms or otherwise.*

*But since health is much too important for its measurement in monetary terms to be more than indicative for purposes of management and planning, the Organization had previously paid only intermittent attention to these matters in their own right, the financial or economic aspects of both health problems and of solutions proposed having been far more often dealt with incidentally rather than systematically.*

*The economics of providing health care is, however, a subject of growing importance and in 1973 the Organization arranged an interregional seminar to consider the subject in some detail. This publication is a summary of both the proceedings and some of the contributions to the seminar. It is hoped that it will help health administrators in the planning of health services and that it will interest students of medicine and of economics in the subject. A knowledge of health economics will enable those responsible for obtaining and deploying health service funds to make fuller and more effective use of the information and increasingly complex administrative and management techniques available in their endeavour to provide for the peoples they serve the highest attainable standard of physical, mental, and social wellbeing.*

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## CHAPTER 1

# GENERAL CONSIDERATIONS

### INTRODUCTION

A WHO Interregional Seminar on Health Economics was held in Geneva from 2 to 16 July 1973. It was attended by 18 participants from all six WHO regions.<sup>a</sup>

Welcoming participants, Dr H. Mahler, then Assistant Director-General, recalled that, while the costs of health services were increasing, the information about them available to the public was of poor quality and lacking in objectivity. He expressed the hope that the Seminar would not only review the relevant concepts and facts but, in studying the economic approach to health services, also examine them in particular from the point of view of the benefit to the "consumer". Some of the questions of the moment to which clearer answers are sought are: what is a reasonable price to pay for health; what are the relations between consumers and health services; do consumers of health services receive value for money; and to what extent do consumers and/or producers benefit from health services? In that connexion, in most countries the health services are among the three largest "service" industries.

### THE AIM OF HEALTH ECONOMICS

Economics applied to the health field, or "health economics" as it is now called, seeks *inter alia* to quantify over time the resources used in health service delivery, their organization and their financing; the efficiency with which resources are allocated and used for health purposes; and the effects of preventive, curative, and rehabilitative health services on individual and national productivity. The Seminar was unable to cover all the

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<sup>a</sup> Participants are listed on pp. 43-44.

relevant topics, nor could it, under its terms of reference, confine its attention to the direct application of the principles of health economics to decision-making in health programming, health planning, and health service management; hence a number of distortions and omissions could not be avoided in the preparation of this report.

For instance, it should be borne in mind that health economics principles are abstract and remote from considerations of politics, power, and value conflicts, bargaining, and institutional reality. But where economic analysis is concerned, political and institutional reality must be explicitly taken into account. The analysis is "policy-oriented" if it is conducted from a certain viewpoint and within specific institutional constraints and opportunities. Policy-oriented analysis is useful for specific policy purposes, such as persuasion in favour of a certain course of action. Even where analysis shows that certain health service developments would be effective and well within the resources of the health sector,<sup>a</sup> further analysis is required to show whether, and how well, the health department could mobilize the required resources within its limited policy means, and both stimulate and maintain the required changes in the health sector. Economic evaluation techniques such as detailed cost/benefit analysis are most useful in a static and known decision environment. In reality, many policy options are only vaguely defined or have to be actively sought out. And the options to be considered are not only those within the organized health sector but also those of maintaining and promoting health through relevant actions in other sectors. Moreover, the implications of options over several years are often difficult and costly to forecast owing to lack of a reliable data base or the many uncertainties they entail. A detailed analysis of the kind discussed will therefore often not be feasible. Since decisions have nevertheless to be made, analysis will often have to consist of a crude, less costly, and iterative process of decision about priorities, programming, project design, and monitoring.

Consumers of health services were mainly discussed by the Seminar in terms of their health needs, the incentives they offer for service action, and the costs they incur. Little reference was made to the possibility of revealing or inferring consumers' preferences from their actual health behaviour, e.g., how much they currently spend on self- and folk-produced and on organized health services in relation to their expenditure on other goods and services. Consumer demand for health services reflects not only the need for health care but also other requirements including amenity, security, and certification. Calls for consumer or community participation gloss over the need for specifying, in each context, those modalities and facets of service decision-making and management in which the consumers and communities can most effectively take part, and for specifying also how the efficiency of these processes can be promoted over time.

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<sup>a</sup> For the purposes of this report the health sector includes all health services and service resources for which the health ministry or other government department has legal responsibility, either for direct production and delivery or for supervision and development.

One view is that a knowledge of the applications of economics to the administration of public health enables health planners to hold their own in discussions with other planners, with planning commissions, and with key government departments such as finance ministries. A knowledge of health economics also helps those responsible for the management of the considerable and increasing share of national resources being devoted to health services to meet the growing demand on the part of governments, legislatures, and the public for an explanation of the increasing *per capita* expenditure and spiralling costs of these services. It also helps them to ensure that the health services—and through them the consumers—obtain value for money and to limit in the process the freedom of the providers of care and of the international pharmaceutical industry to pursue their own exclusive interests within the health services. Health and socio-economic planning would be more easily linked if health planners were more aware of the economic impact of health services and other health-promoting action, though they should at all times bear in mind that, rather than an increase in national income, the aim of the health services must be better health—a social gain no less real for being difficult, if not impossible, to assess in monetary terms.

Another view is that health economics can bring to the health planning process a number of specialized techniques, such as statistical analysis, cost/benefit analysis, and systems analysis, combined with a certain detachment which, though not informed by the detailed knowledge and involvement of the medical practitioner, can give greater objectivity in the consideration of rival claims for priority. Among the economic concepts that health administrators should find useful are:

*Opportunity cost*, or the evaluation of what sacrifice is entailed—in terms of possible solutions to other problems—by the allocation of resources to the chosen activity.

The *margin*, or the amount by which a health programme should be increased or decreased in given circumstances (decisions for or against an entire programme being rare).

*Quantity/quality conflict*, or the distribution of health services where high quality will often mean fewer beneficiaries. (While what constitutes equality and fairness is basically a moral decision, economic efficiency and opportunity cost must also be taken into account.)

*Cost/benefit analysis*, or the organized consideration of the disadvantages and advantages of alternative policy options in terms of a common denominator, namely a common value unit, or *numéraire* (often a unit of money) and a common point of incidence, both in time and in terms of a system target (e.g., a nation, a region, the economy, or the health sector).

Where economic efficiency is concerned, the economist's view is that health services can be made either labour intensive or capital intensive according to the stage of development of the society they serve; that it is

not axiomatic that prevention is economically more efficient than cure (that will depend on how many cases of illness are prevented and at what cost); and that not only medical practitioners, but all members of the community, have a vested interest in the function of health services, the need being for incentives to help reconcile the interests of individuals with the interest of society as a whole.

Yet another view is that the advance of civilization with all its needs (including the increasing demand for health care on the part of individuals) and the development of a variety of specializations in economics and management (which last two can be combined) has made health economics an independent area of theory and practice. Its main function is to apply that theory to the practical problems of rationalizing the use of resources for the supply of effective health services in response to demand, using modern management processes and techniques. These include the systems approach. In this approach the health care system is regarded as a subsystem of the national economic system. This subsystem, with its well-established goals, is treated as having its own integrated subsystems and as functioning in a dynamic environment. Planning and forecasting then become the managerial functions of prime importance; organizational changes are required in response to a changing environment, in order to permit the emergence of new administrative structures, better fitted to the attainment of health service goals; and input/output analysis,<sup>a</sup> automated control and decision-making take on increasing importance, as does the management of people by integration, which depends on overcoming resistance to change.

In relation to a mixed health economy the following points should be borne in mind: (1) there is a special need for balanced development; (2) in the private sector individuals and families decide their own priorities; and (3) the health industry, being often labour intensive and using highly skilled personnel, cannot adjust readily to rapid national development and growth.

Health economics has points of similarity and even interdependence with engineering economics. In both sectors, economic analysis shows the advantages, in certain circumstances, of proven reliability and simplicity rather than modernity as criteria in the choice of equipment and technologies.

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<sup>a</sup> Analysis of the actual or expected flow of goods and services between relevant groups of producers, distributors and users, either within the overall economy or any of its sectors, such as the health sector. The quantity or value relationships between the production, distribution and use of goods and services in each time period are summarized in terms of one or more input/output tables or matrices. A major aim is to identify imbalances, such as waste and bottlenecks.

## CHAPTER 2

# MACRO ASPECTS OF HEALTH ECONOMICS

This chapter deals with the economic study of the health sector as a whole in its relationship with other socioeconomic sectors.

### OVERVIEW OF COSTS OF HEALTH AND HEALTH SERVICES

#### *Costs, concepts and trends*

All the needs and wants of society cannot be met at the same time even in the richer countries, so that opportunity costs are incurred by all users of resources, and the scarcer the resources, the higher the opportunity costs. In the case of health and health services, these costs are incurred both by producers of health services, through their use of staff, buildings, equipment, materials and supplies, etc., and by consumers, who use transport to the health services, drugs, etc. Overall health service costs should include opportunity costs on both sides.

As regards the costs of sickness, a distinction must be drawn between the cost of health care—which may or may not be borne directly by the patient—and other costs, including loss of earnings by the patient and his family and additional costs of special foods, clothes or other articles, which usually do fall on the patient and his family. To these may have to be added disability or rehabilitation costs—for such items as appliances or equipment, and retraining for more suitable employment—which should include all costs over and above the normal costs of everyday life both at work and at leisure for non-disabled persons in the same category, i.e., of the same sex, age group, occupation, residence, etc. Some of the costs of sickness borne by the patient may be reimbursed in the form of sickness benefits, often earnings-linked, or as a lump sum in compensation for loss of earnings and pain and suffering, despite the difficulty of evaluating the latter.

The borderline between the health service sector and other socioeconomic sectors is not clear in any society; moreover, a working definition

of what constitutes the health service sector for the purposes of provision of care and evaluation of costs cannot be the same in all societies, and, in all countries, a substantial proportion of people diagnose and treat their health problems themselves.

For the evaluation of the costs of health care—to society rather than to a category of users—money spent on resources was not considered always a good indicator. Such expenditure might be artificially high owing to high taxes or profits, or artificially low owing to subsidies and grants. Moreover the figures available for many countries related to health service expenditure only and usually excluded costs of consumer travel, and of self- and folk-produced health services.

However, funds are usually limited and hard to come by; inflation further restricts their value and there is normally increasing resistance to higher taxation as a means of raising more. It is therefore important for them to be carefully husbanded, allotted budgets being effective constraints. Health service costs were therefore discussed at some length in terms of monetary expenditure. Because practices differ from country to country, it is not easy to compare the amounts of money spent on health services, or the headings under which health services are classified. Professor Abel-Smith's book "An international study of health expenditure" remains the standard work on the subject, with its comparison of the expenditure on health services in over 30 countries and territories.<sup>a</sup> Standard national accounting procedures are being revised under the auspices of the United Nations, so that by about 1980 the figures for health services expenditure should be more readily comparable. There remains, however, the question of the structure both of health budgets (for major provider agencies, including health ministries) and of cost accounting for health services within the national accounts system. Simple, practical forms of cost-accounting are being tried out in some countries in an effort to improve budgeting and accounting aspects of health service management.

As for the structure of health budgets, health service expenditure can be subdivided into capital expenditure on physical facilities and durable goods, on the one hand, and, on the other, recurrent expenditure on personal services, both within health institutions (to inpatients and outpatients) and outside (e.g., domiciliary or community care), and other services, such as environmental improvement, and teaching and research.

Expenditures on medical care are rising in both developing and developed countries. Capital expenditure varies from 3% to 12% of total health expenditure. Inpatient services are a large and fast-growing part of all health service expenditures; hospital costs tend to be nearly half the total current expenditure; staff costs—which alone account for about half the cost of all personal health care—together with drug costs take up the largest share of all health service expenditures. Even in some of the richer countries the proportion of national income devoted to health is still increasing and, if present trends continue, several may be spending

<sup>a</sup> See Bibliography, p. 38.

some 10% of their national income on health services before the year 2000. In some of the richer countries changes are also taking place in convenience costs to the consumer, among them new patterns of travel associated with service, such as fewer home visits.

#### *Reasons for cost trends*

*Demographic reasons.* Developing countries and others need to divert more resources to health services if they are to put into effect the declaration in the Constitution of WHO that the enjoyment of the highest attainable standard of health is a fundamental human right, which implies availability of health care. For not only is there often little or no provision for some of the population but, especially in the developing countries, a constant increase is required in resources for health care merely to keep pace with population growth. A similarly constant increase is needed in the developed countries to meet the more frequent and more costly demands of an aging population.

*Labour-intensive nature of health services.* With economic development the costs of human resources (wage rates) tend to rise. Although health services are often regarded as highly labour intensive, there are ways in which physicians can make greater use of drugs and diagnostic equipment and other capital resources to render health services more capital intensive. The point is therefore not that health services are necessarily highly labour intensive but that there is limited scope for saving on labour costs in personal health services.

*Quality of health services.* This is a widespread and major preoccupation within the medical profession. Advances in medical technology provide means of improving the quality of diagnosis and therapy. But unfortunately, for any given advance, the cost is often greater than the increased effectiveness achieved, so that the otherwise laudable pursuit of quality brings with it such costly and wasteful features as proliferation of proprietary drugs; the expansion of pharmaceutical advertising to the medical profession; the transfer of more and more services and service elements to narrowly skilled or specialized agents and facilities although such services could equally well be performed by those less skilled and with more modest facilities.

*Public expectations.* Expectations rise as the threshold of discomfort falls, and there is an increasing demand for higher standards of amenity in health services, especially inpatient facilities. The public tends to forget, and is not always reminded, that its own health behaviour is partly the key to better health. Indeed many developing countries find that preventive personal health service capacity is often under-utilized, while new curative capacity generates its own demand and adds to the pressure for increases in curative health services.

*The changing epidemiological picture during socioeconomic development.* As communicable diseases are brought under control, the cost per case prevented or detected increases. Chronic and degenerative diseases with

their high costs for care, or for cure—when, exceptionally, this is possible—then increasingly dominate the picture.

*Organization and structure of the health delivery system.* A system that is badly organized and structured at the start will often go from bad to worse as socioeconomic development proceeds. There may be a multitude of agencies financing and delivering parallel and uncoordinated health services, with consequent overlapping. Resources are often wasted on inessential services or through other forms of bad management. Special financing schemes, such as health insurance in some developing countries, may be set up for small privileged groups which then have the benefit of whatever health care may be available, to the exclusion of the rest of the population.

*Extension of health service coverage.* In developing countries in the early stages of their development, as well as in the backward areas of developed countries, attempts to extend the range, coverage or impact of services to a larger population increases costs more than proportionally. Examples of this are: low acceptance of and lack of continuity in the utilization of active health services, especially family planning services, due to low levels of education; difficulty of vector control and provision of environmental services in relatively inaccessible areas; lack of attraction of remote areas for skilled health manpower; difficulty of establishing a rational health service delivery system in a generally disjointed administrative structure; longer stays in hospital than are medically necessary when home environment is not conducive to convalescence or rehabilitation.

#### *Some examples of ways of containing health service costs*

It has been emphasized that to save on health service costs is not a valid objective. The objective must be to realize the same benefits at lower cost or to increase benefits without adding to costs. Whenever both parameters are liable to change, benefit analysis has to be conducted jointly with cost analysis. It is therefore assumed for the purposes of this section that the benefits will remain unchanged.

One way of containing costs is to ensure that the degree of technical complexity involved is appropriate for the task to be performed. In the case of staff, those that are highly skilled, such as physicians, should not be employed on tasks that could be performed by staff that are less skilled: the use of auxiliary manpower for vaccinations is a case in point. An important corollary to this is that the general population should do more, through its own behaviour, to maintain better health. Again, much can be achieved by the standardization of drugs, equipment and construction technology to the minimum acceptable, and therefore relatively inexpensive, level. The savings in cost thus achieved will in many cases be far greater than the additional costs incurred in the supervision of less skilled manpower, health education of the public and the enforcement of minimum standards.

Another and related way of containing costs is to evolve a “resource

mix” suited to the situation. Where investment capital, taxable capacity, foreign exchange, highly skilled local manpower, etc. are scarce they should be used only where they cannot be replaced by less scarce resources. Conversely, resources, that are relatively more abundant should be utilized more extensively. For instance, developing countries may be able to make better use of traditional health manpower, local building materials and the services of local organizations.

A third way of limiting costs is to ensure that all resources are used to full capacity, avoiding waste by ensuring that they complement one another where possible and serve as many users as possible. It would be wasteful, for instance, to employ more hospital staff than is needed to service the wards, or to keep available more beds than is justified by the number of patients needing them; to install electrically powered equipment where the supply is inadequate, and to install equipment for only occasional use. Single-purpose health workers, e.g., members of malaria teams, if not fully employed can often be given additional responsibilities. Equipment should be properly utilized for the whole of its working life unless it can be replaced by a cheaper substitute; buildings, machinery and equipment should be adequately serviced to keep them at optimum operating levels.

Economy in the procurement of resources of given characteristics is another way of containing costs. Drug production, marketing and use, and local training and utilization of health manpower were also discussed in this context.<sup>a</sup>

Incentives, properly used, may also help control costs, and the decentralization of management, including control over a part of health services funds, associated with effective motivation and supervision, can result in savings.

The financial power of third-party payers, such as insurance schemes, can also be applied to control health service costs and utilization. For instance, such schemes should not preferentially cover the more expensive modes of treatment, such as hospitalization, since this would provide insured persons with an incentive to use them; in developed countries, public awareness of the cost of increasing the facilities for expensive modes of treatment can be enhanced by such measures as financing hospital construction through public bond issues. Other, more positive, measures include reimbursement penalties, or limitations, on unnecessary utilization, or the abandonment of a simple fee-for-service system of payment for physicians with its built-in incentive to overutilization. In one developing country incentives were being provided for service in rural public health, but these were still small compared with the rewards of private practice under fee-for-service insurance schemes in the towns. Care should also be taken to avoid conflict of incentives which would then become ineffective and wasteful.<sup>b</sup>

<sup>a</sup> See pp. 27 and 29.

<sup>b</sup> For a further discussion of incentives in relation to health service effectiveness and efficiency, see pp. 28-31.

### *Monitoring costs: problems of cost accounting*

The main problem is to determine the appropriate cost unit. Present cost accounts are mainly administratively or institutionally based, i.e., they show how much of the costs relate to staff, equipment, drugs, etc. for agencies and facilities as a whole. Thus they do not lend themselves to comparison of costs of different health services for a given type of patient or for a given "mix" as provided by complex teams or installations. The same is also true of costs based on simpler units, such as costs per patient, inpatient-day, or hospital bed. Such cost figures also ignore a number of essential variables such as the health risk or the gravity of the problem dealt with. In other words, the accounting methods currently in use do not, as a rule, permit comparison of the costs and benefits of dealing with given health problems in different ways.

The most appropriate cost unit is that of a group of health risks and problems involving similar ailments or diagnoses and calling for similar technology or intervention operations, i.e., policy actions aimed at mitigating or eliminating these risks and problems. In many cases, the group of problems will coincide with those being tackled through a health service programme, as in the case of an environmental sanitation programme, for instance. If there are too many types or classes of cost unit, cost accounts will become unwieldy. If there are too few, the accounts will be useless since within-class variations will exceed between-class variations. Where several programmes use some resources jointly, such as those for teaching, research and provision of medical care, the proportional allocation of total costs among programmes is often difficult and to some degree arbitrary.

Cost accounts need to be standardized for each programme and broken down by type of resource, such as staff, machinery, drugs, etc. It is then possible to use them for forecasting the costs of expanding some programmes and reducing others. The outcome is an effective monitoring system (covering time, space and facility) that identifies which operations and activities are more costly than others. The reasons for high costs can then be sought out and the activities involved can be evaluated. For teams or installations providing comparable services it may be useful to take the one operating at lowest cost and to consider performance in terms of benefits achieved. If these are adequate, the technology can be transferred to or adjusted for the other comparable facilities incurring higher programme costs. There are many ways of setting up, developing and operating cost accounting systems, and so each country can make its choice among several accounting systems and ways of developing them in order to achieve the most profitable result.

#### OVERALL HEALTH SERVICE BENEFITS

### *Benefits in terms of satisfaction of health needs*

Health services of appropriate scope and quality can serve to satisfy many of the health needs of the population. Preventive health services

decrease community health risks, e.g., by providing environmental sanitation or communicable disease control. Curative health services reduce personal health impairments or problems, where possible, and provide personal care in the sense of increasing the patients' comfort and alleviating pain and suffering. Community health hazards and personal health problems are often strongly influenced by the general social and economic conditions prevailing and by the degree of development as they affect, *inter alia*, schooling, housing, food and the working environment. The net influence of such social and economic factors may be to increase or decrease health hazards and problems: migrant workers and tourists may spread diseases; irrigation schemes may spread the risk of schistosomiasis; road development and the introduction of agricultural machinery may increase accidents—to mention a few harmful effects of essentially beneficial measures.

The impact of health services depends also on their utilization and maintenance by the population (as in the case of environmental health programmes) and the cooperation of patients and their willingness to follow prescribed regimes (in the case of curative health services). It is therefore hardly surprising that only in a few and highly specific cases have medical science and epidemiology been able to estimate the impact of health services on the reduction of health risks and problems.

One fact clearly emerges: there is no predictable relationship between improved health on the one hand and the amount or cost of resources used in producing health services on the other. For instance, the indicators for one Latin American country show no improvement in health over the past decade in spite of a high and increasing ratio of physicians and hospital beds to population.

There has been no successful and agreed index of population health status in any country. All countries have some indicators, such as the general mortality rate or certain age-specific mortality rates (especially infant mortality rates) and morbidity rates for certain ailments or diagnosed pathological conditions (especially the communicable diseases). Community health hazards may become personal health problems at various times in the future and it is not clear how this time dimension can be taken into account. Another problem is how to rank and add different health problems in terms of significance. Yet another is that different people, including medical specialists, will value a given health impairment differently. Indeed, any index of population health status would measure health problems rather than positive health.

How much economists can really contribute to the establishment of a health status index is an open question. In the past, they have been reluctant to embark on the measurement of "outcomes" other than goods and services. In a short-run analysis, quality in the sense of presumed or potential outcomes (as judged, through audits, by the way in which health services are delivered) can often be substituted for actual health service outcomes or impacts. It has also been suggested that quality is a con-

tinuous variable whereas effectiveness in clinical health terms is often discontinuous. At the Seminar there was some discussion on measuring and aggregating health service outcomes, such as increasing the patients' comfort and alleviating pain and suffering, although no positive conclusion could be reached. Some participants disapproved of the exclusively clinical and psychological orientation of the discussion on health status, preferring to consider health benefits in terms of the ability of people to function properly in their daily life, i.e., especially in terms of a reduction of disability.

#### *Health services as consumption and investment*

Economists label the utilization of goods by individual persons and households as "consumption", in contrast to "investment", which is the instrumental use of goods to produce other goods.

Health services—with the exception of some environmental health services—do not produce any economic commodities directly. It is therefore legitimate to consider most of them as consumption rather than investment.

On the other hand, better health is one of the objectives of socioeconomic development, but only one, along with, for example, improved material standards of living, improved work and educational opportunities, and more equal access to the benefits of modern science and technology. In a narrow sense, economic development requires, among other things, a better quality of labour, achieved through better health, education and other social endeavours. This is the basis of a newer theory of human capital, in which health contributes to economic development as one of its components. In this context, health services can be regarded as instrumental, i.e., as in the nature of investment in a wider sense.

Although it may be agreed that health services in general can have both consumption and investment characteristics, it is not clear whether particular health services, such as personal preventive health services are to be regarded primarily as consumption or rather as investment.

A tentative solution might be for developing countries, where health problems may be a greater obstacle to economic development than elsewhere, to place the emphasis on the investment aspects of health services and for the developed countries where health services are regarded as meeting existing demand for fulfilling personal health needs to place corresponding emphasis on the consumption aspects.

#### *Direct economic development benefits of health services*

Manpower is a prime resource in the production of health services; these can therefore provide employment opportunities for otherwise unemployed or underemployed people, especially in developing countries. The less skilled the manpower used, the more employment can be generated. These benefits in terms of economic development can be increased if the extra employment itself generates extra savings and thus opens up

material investment opportunities for the economy as a whole. Again, where physical facilities are concerned, health services that use mainly local building materials contribute to the release of scarce foreign exchange for other development purposes.

Environmental sanitation programmes may not only increase the quantity and quality of water supplied but also facilitate access to water resources, thereby improving the local standard of living.

By containing population growth, family planning services, which are often provided within the health sector, may contribute to a faster increase in national income, *per capita*, than would be possible with population growth unchecked. Such effects on economic development are brought about mainly through increased saving and investment opportunities; and they have been investigated by means of macro-economic models.

#### *Economic development benefits of improved health status*

In so far as improved health status may often have an important influence on economic development, health services may also bring indirect economic development benefits.

Most of the preventive health services in developing countries are dramatically lowering mortality rates in the lower age groups. Although this may be regarded as a benefit the very high rate of population growth that results can make economic development more difficult. It is mainly for this reason that family planning programmes are being promoted simultaneously with, and as an integral part of, health services in many developing countries.

Health services in these countries can also increase the quality of the labour force: a healthy worker can work full-time and has a greater productivity potential.

But working capacity is not always affected by disease. For example, one schistosomiasis study in a Caribbean island found no difference in absenteeism between infected and non-infected banana workers, and it should be emphasized that in developing countries the economy often cannot take advantage of an increase in the quality of its labour force. This is so when there is widespread unemployment, or underemployment, and where a sick person is readily replaceable.<sup>a</sup>

Developed countries aim mainly at protecting their human capital by "keeping it in good working order", while the objective in developing countries is more often to upgrade labour productivity. Most studies in these countries pertain to the economic effects of single diseases, whereas developed countries are usually concerned with the cumulative effect of multiple diseases. It may be that a more relevant analysis of health needs should start with given economic development programmes and then determine which health problems would make the successful implementation of these programmes difficult or impossible.

Some land is unsuitable for economic development, being depopulated

<sup>a</sup> For further discussion of this study, see p. 32.

or undercultivated because of health hazards such as malaria or onchocerciasis, and opportunities to promote international trade and tourism are lost when there are outbreaks of certain infectious diseases, such as cholera. Control of such communicable diseases will therefore help to foster economic development.

More subtle economic development benefits accrue in developing countries when health services are able to demonstrate significant impact on the health status of the local population. A demonstration of the value of scientific health measures may induce the local population to adopt scientific methods in other sectors, such as animal husbandry.

Health services for groups outside the labour force, such as children and the aged, may superficially seem nothing but a burden on the economy. But concentration of health services on the active population would be likely to have a negative influence on the accumulation of life savings, in pension funds for instance which contribute to the economy's investment opportunities, and even on the current productivity of the labour force, if health services were forfeited on retirement. It would also result in increased infant and child mortality, with the consequent loss of the investment represented by children who do not live to become productive members of society.

#### *Health service benefits in terms of social development*

Health services can offset to some extent the economic disadvantages of certain geographic areas in the sense that they constitute a source of income in kind; this is true, for example, of many rural areas in developing countries where services are provided free of charge. In one Asian country, however, it has been reported that rural areas generate a larger share of national income than they receive in terms of health services. In general, many communicable disease programmes will benefit mainly the rural areas of developing countries.

In these countries, socialized health insurance is often seen as a way of redistributing income in kind among the eligible population. Primary contributors pay a certain percentage of wages to the insurance scheme, and the primary insured, together with their dependants, are then entitled to utilize such health services as they need and are covered by the insurance—among the insured, the healthier subsidize the less healthy. But especially where contributory schemes of this type account for a proportion of available personal health services (and therefore available service resources) that is large compared with the small proportion of the population covered, they may operate to the detriment of the uninsured majority.

In one Latin American country it has been reported that the financing of health services is mainly regressive, i.e., the burden of financing falls disproportionately on the poor though the poor consume less than their proportional share of health services; thus they may make the poor unhealthier as well as poorer. Regressive financing also violates the social objective of payment according to ability to contribute.

Health services at the local level, where available to all, can serve to promote a sense of community by lessening tensions in a society divided by racial, tribal and family feuds, and, where they are financed and controlled by the local communities, they may even serve as a rallying point for community development.

#### *Health service benefits in terms of savings*

Savings may result if a national health service delivery system is properly designed to take into account (1) all components of care and service (prevention, early diagnosis, progressive patient care, etc.), (2) the requirements of regionalization and integration, and (3) the need for a good match between demand and supply (especially as regards the resources supplying the service).

It cannot, however, be assumed *a priori* that the reorganization of the delivery system will in fact generate such savings. This proposition has rather to be investigated and justified by detailed cost effectiveness evaluation in each case.

International port health authorities, for example, maintain costly health services (especially immunization checks and services) because of the risks of international transmission of communicable disease. In considering the economics of this service it has been estimated, in the case of smallpox, that the developed countries spend more on surveillance than is needed to interrupt transmission in the endemic areas (which are in the developing countries). Who incurs costs and who benefits is therefore important in the search for equitable solutions.

#### *The aggregation of health service benefits*

Certain types of benefit are measurable directly in terms of money or incomes, and a few others, such as the repopulation of malaria-infested areas, can readily be valued in monetary terms. Most of the benefits of health and social development, however, cannot or should not be measured by a monetary yardstick. It was noted that some economists try to put a monetary value on human lives, but this was not considered a satisfactory procedure. A social preference function could be used to evaluate and aggregate heterogeneous types of benefit, but it is not clear how such a function could be derived in practice. In conclusion, there is no satisfactory and generally accepted way of aggregating all types of benefit.

#### SOME ADDITIONAL ISSUES FOR HEALTH SERVICE PLANNING

Planners considering any type of service are rarely called upon to take an "all or nothing" decision but typically a "marginal" one. It is therefore dangerous to evaluate programmes and projects in isolation from each other. Marginal cost/benefit comparison is the technique to use.<sup>a</sup> It was agreed that benefits cannot all be added together nor are they all even measurable; that the distribution of costs and benefits is of importance, and that the decision-maker should have full responsibility for the choice

<sup>a</sup> For a definition of "margin", see p. 11.

of interventions and priorities. Technical officers, including the economist, can only aid decision-making by making the options clear (such as rural *versus* urban, high quality somewhere *versus* low quality everywhere, etc.) and by showing some relevant outcomes of the various options in terms of costs and benefits.

Priority-setting cannot be reduced to a simple formula; instead, the planner has to start from social objectives and, by identifying the gaps between targets and reality, identify the needs. When they have been identified and ranked, especially by epidemiological importance and amenability to intervention, the appropriate health service system can be designed by specifying the magnitudes, locations, levels, functions and channels of resources and funds. In some cases low cost-efficiency can be detected by simulation before the practical test. A timetable for the actual development of the system with operational controls can then be worked out.

The art of planning consists partly in estimating in advance the costs of and benefits from each activity, in examining actual costs and benefits during implementation, and in steadily seeking out methods of increasing benefits and decreasing costs and introducing and monitoring such methods. A useful technique for this purpose is planning and budget allocation on "programme lines", i.e., what is known as a programme planning and budgeting system (PPBS). Each such programme consists of medium- and long-term activities and projects that are oriented to a common objective, ideally without regard to administrative boundaries.

Health service development should be justified not in terms of health status improvement alone but also in terms of its impact on economic development and other social sectors. It is equally true that health service delivery is an important and flexible policy instrument: health services can be used to redistribute opportunities for development to rural and other less favoured areas in developing countries.

What resources a society is justified in devoting to improving the health impact of health services or how the cost and financial burden of health service delivery should be distributed are political decisions. The role of objective analysis is to provide a more informed and rational basis for such decisions. Two possible ways in which public health authorities in developing countries can try to increase the resources at their disposal should be considered. One way is to demonstrate the contribution of public health services to priority objectives in economic and social development<sup>a</sup> and so persuade other sectors such as agriculture, industry and trade to contribute a share of their resources to health work. The effect of this might, however, be nullified by counter-claims from other sectors; for instance the agricultural authorities might maintain that agricultural development would do more to improve rural health than any additional health service. The other way is to draw on the resources of local communities by having them finance, manage and develop a large and increasing share of their basic health services themselves.

<sup>a</sup> As described above, pp. 20-23.

## CHAPTER 3

### MICRO ASPECTS OF HEALTH ECONOMICS

This chapter deals with the economic study of individual components of the health sector.

#### RELEVANCE OF THE PRODUCTION FUNCTION CONCEPT TO THE DELIVERY OF HEALTH SERVICES

A production function is a mathematical expression of the purposive transformation of production inputs into production outputs. It is therefore a tool for analysing the various techniques and processes by which different inputs or components can be combined to produce outputs of various kinds, such as health services.

Health services are produced by means of various forms of labour (with variable investments in terms of education and training), fixed capital structures and installations, consumable equipment, etc. For these components there is, at any point in time and space, a corresponding set of prices or costs. Thus, of the many possible production methods, some are more expensive than others in producing specific items of service to given specifications—such as days of hospital care, number of immunizations, or home deliveries—for well defined diseases or health problems. Normally, prices for different resources should act as an incentive, or disincentive, to their use in the production of health services. However, when prices are not closely related to real social costs,<sup>a</sup> there will be a tendency to waste the most precious or scarce resources and to economize, mistakenly, on the less costly ones.

The concept of a production function was also found to be applicable to the production or development of items needed to render services, e.g., to the construction of hospitals. The same type of facility may be produced by different methods at widely differing cost: for example, one method may rely heavily on local labour and building materials whereas another

<sup>a</sup> For a description of this relationship, see the subsection on costs, concepts and trends, p. 13.

mainly utilizes the labour of foreign designers and foreign materials. In several countries it has been found that low-cost resources could be substituted for high-cost resources without any adverse effect on health service delivery or effectiveness.

#### *The effectiveness of health services*

Because health services themselves are only intermediate to the production of better health—and indeed of better living conditions—for the population, the notion of the production function can also be applied to the production of health and other outcomes by health services. Yet health services are just one of the many inputs for the production of health, others including schooling, housing, food and the working environment.

In relation to the outcomes produced by health services, a distinction may be made between effectiveness and benefits. This distinction is a practical rather than an absolute one. Effectiveness of health services is the relation between the actual and desired (or planned) achievement of final objectives—mainly health protection and promotion—while benefits of health services are the resulting advantages or reduced disadvantages, not only in terms of health protection and promotion but also in terms of economic and social development and other desired outcomes.

Some health services are more effective than others, whether potential or actual impact on health is the yardstick. Unfortunately, the intermediate and indirect measures of health service outcomes are often used in evaluating effectiveness in view of the great difficulty of measuring unequivocally the net effect on health of the services rendered. In this connexion, it is dangerous to use intermediate targets as operational measures of success. For example, health service loads are not necessarily related to health impacts: while the loads may increase, shortfalls from impact targets may become progressively larger, and, in terms of ultimate health goals or objectives, there may be no change for the better at all.

In summary, there are several production functions applicable to: (1) each of the resources or components of health services; (2) health services and service programmes themselves (made up of several such components); and (3) health and other desired socioeconomic benefits made up of several service and other components. Each of these three types of production function has its specific inputs and outputs. Since the production of health is the major objective of the health sector, the production function of the health sector can be regarded as the extension of a three-dimensional system of input-output matrices. However, its quantification would require much information and would be very laborious; also many methodological and practical problems remain to be solved before this approach can be confidently used. There is still a long way to go before the impact of generalized services—however produced—on community health can be assessed, but there is more immediate hope for the assessment of the effectiveness of services for specific conditions, such as diarrhoeal diseases. Yet, it is in relation to the main components of health

care, namely those which account for most of the expenditure, that methods of making economies and cutting expenses can best be studied.

*Major components of the production function in the health sector: a study of pharmaceuticals as a case in point*

The assessment of drug production, marketing and use is relatively more straightforward than, for example, the assessment of the use of different types of staff and may be studied as an example.

Expenditures on pharmaceuticals or drugs, although often hard to measure as a separate cost item, may vary from 10% to 15% of the total health services budget. They may account for a much higher proportion of the total expenditure of certain health service agencies, rising under certain types of health insurance to 40%. The high cost of drugs may be related to high levels of use, to high prices (often including a high margin of profit), or to both. But, in considering value for money, effectiveness must be taken into account as well as cost.

A very wide range of retail prices obtains in different countries for the same drug marketed by the same company, and chemically or biologically identical drugs vary in price according to brand name, while drugs sold under a generic or pharmacopoeial name usually sell at much lower prices. Proprietary names are a feature of the patent system that often generates additional profits. These profits are used, in principle, to cover research and testing costs for the same, or for less profitable, drugs (including some that are not released for sale). However, the exclusive use of a name often outlasts the patent period and so still gives the product clear advantages over rival products.

The pharmaceutical industry produces large numbers of competitive new drugs or drug combinations every year, but only a relatively small proportion satisfy effectiveness criteria laid down in such countries as the USA. Yet only a few countries restrict the sale of ineffective drugs, or drugs of unproven efficacy, while high-powered and selective advertising—aimed at physicians whose critical sense may not be very keen—still guarantees these doubtful products a lucrative market.

The remedial measures available include: non-recognition of patent rights held by international drug companies (although this may be associated with difficulties of drug quality control); mandatory requirements for proof of effectiveness (which involves a difficult and costly procedure, possible only in a few developed countries); voluntary price agreements, supplemented by discretionary powers to remove patent protection in cases of flagrant abuse; and discretionary powers for pharmacists to substitute generic forms of drugs for brand presentations. The establishment of a national formulary of life-saving drugs (under pharmacopoeial names) may divert some of the demand from patented pharmaceuticals, but may be considered incompatible with professional freedom of prescription. Although such national formularies may initially consist of few drugs, they tend to become long and unwieldy. A variant may permit the

inclusion of proprietary names provided the maximum retail price is within certain predetermined limits. But government regulations may not be effective where they are established under pressure from or the influence of the very concerns that they aim to control.

Economy in drug treatment depends not only on the price of drugs but also, and more significantly, on their effectiveness and safety, and the mode and frequency of their administration. In general, the range of effectiveness is wider than the range of safety, so that effectiveness is the more critical consideration.

In developing countries the suggested priority in drug economics may be the development of effective therapeutic strategies for important communicable disease and community health problems, while in the more developed countries the emphasis shifts to the solving of such problems as overprescription, defaulting from treatment, and careless use of drugs. A first step would therefore be to determine the most economic treatment regimes for common conditions (i.e., appropriate prophylactic, symptomatic or curative regimes) by comparing the efficacy, safety and economy in use of several competing methods. Given proper information, persuasion and control, this approach may lead to either improved efficiency of care or reduced expenditure, or both.

It has been reported from developing countries that multinational firms sometimes produce cheaper drugs under nonproprietary names for local sale and consumption; in other cases government agencies manufacture and test selected drugs in a progressive effort to reduce local shortages of reasonably priced drugs and to bring about qualitative improvement in production standards.

Another way of reducing costs is to set up a central agency for the purchase and distribution of pharmaceuticals. This agency would, by its very nature, be in a strong position to negotiate and control costs of both imported and locally produced drugs. However, there is a dearth of information regarding the kind and quantity of drugs required; drug consumption studies to serve as a basis for rationalizing production are just starting in a few developed countries.

Among the factors that may reduce excessive drug prescription or consumption is to require the consumer to bear part of the costs, even if the service is nationalized or provided under prepaid schemes. At the same time, where services are paid for directly, the consumer is often willing to spend a good deal more than is necessary on therapeutic agents in the belief that price is proportional to effectiveness.

#### THE USE OF INCENTIVES FOR PROMOTING THE EFFICIENCY OF HEALTH SERVICES

##### *The role of incentives in health services*

The shortcomings and malfunctions within health services are, at least in part, attributable to failure to recognize the importance of existing and potential incentives—both monetary and non-monetary—in obtaining

the best health value from current resources. Both providers and consumers should have incentives for evolving health service delivery patterns that promote and protect health better at a reasonable cost.

Certain features of current health service practice may operate as incentives to undesirable ends. Health service insurance schemes often provide more incentive for curative than preventive service; also they often favour inpatient care rather than cheaper alternatives. Most forms of organized service offer more incentives for the provision of care in an urban than in a rural setting. Different forms of physician payment offer incentives for different patterns of service—none of which is entirely satisfactory.

Ingenuity can be used—though it is often conspicuously lacking—in the introduction of new (or the manipulation of existing) incentives to discourage the excessive use of health services—and to discourage also the use of these services when such use would be of doubtful value. A number of specific health service programmes were discussed with special reference to the way incentives do, or could, operate to relieve the situation.

#### *Incentives for the geographical redistribution of trained health manpower*

Incentives (ranging from “compulsion” to financial inducements or fringe benefits) are used in some countries to promote rural service by physicians, especially recent graduates. In this connexion it is important to provide adequate supporting staff and equipment for physicians working in rural posts. Rural postings may be used within a regionalized service, with opportunities for rotation of duty station and for in-service training being available to all staff. Many participants stressed that rural health manpower was often transient and did not provide long-term continuity of service.

Decentralization of training is one way of attacking the problem. If outlying areas had their own training centres, the personnel trained there would be more likely to serve in the area and would also be readily accepted and highly appreciated by the people they served. If medical and health care cannot be easily brought to the consumer, consideration should be given to bringing the consumer to the provider—the cost may not necessarily be any greater. Often the crux of the matter lies in the fact that peripheral or front-line services do not meet the expectations of either the provider, who may be professionally overtrained, or the consumer, who does not realize that the service is adequate and appropriate to his basic needs.

In addition to the maldistribution of skilled health staff within a country, there is the difficult problem of maldistribution among countries. Differences in earning potential are the main motive behind the international migration of doctors, nurses, etc. This flow of trained people represents the main item of international assistance from the developing to more developed countries. Such assistance may even be greater than the development assistance flowing in the opposite direction. The missing

incentive to stay in the home country is often a form of training appropriate to local service needs. This argument militates in favour of the development of basic and even postgraduate education in the country where the manpower is to be retained; although initially more expensive, this may prove cheaper in the longer term. It is also important for the numbers and types of personnel trained not to exceed service demand: overproduction certainly promotes export.

*Incentives related to physician payment and health insurance*

Health insurance may provide an opportunity (i.e., an incentive) for certain segments of the population to become heavier users of services. Fee-for-service payment of physicians working on behalf of insured patients can act as an incentive for extra—perhaps unnecessary—visits, consultations or other services. This in turn increases the burden on the contributor to an extent that may become intolerable, especially in developing countries where part or most of this burden has to be borne by the State. The difficulties inherent in correcting abuses or undesirable trends in health insurance practice include low efficiency, excessive support for the private health sector (far removed from the original motive), an incentive to hospitalize and a disincentive to provide services for the prevention of disease and the promotion of health.

A fee-for-service remuneration system may become complex and may lead to costs rising much faster than the standard of living. In some countries, this trend may be promoted by the practice of physicians legitimately owning their hospitals and pharmacies—a clear incentive to greater profits; elsewhere this may be ruled out by professional or ethical considerations. Recent experience in one Scandinavian country which has made the change from fee-for-service payment of doctors to salaries appears to be encouraging, and satisfactory to both consumers and providers of care. Among the latter, envied differentials among the specialties had disappeared in the process, and many physicians now preferred more leisure with an adequate salary to higher remuneration at the cost of little or no free time.

The difficulties of providing incentives for diligence and careful work by physicians and other health staff may be contrasted with the ease of rewarding higher qualifications.

Health insurance schemes might introduce “no-claim” bonuses, or penalties (which could be transferred to the physician) for unnecessary items of service. Similarly, a sliding scale of “prices” might be introduced, so that inherently more effective services would rate more cheaply than those less likely to produce results on health.

Other remedial measures might include patient participation in direct costs (over and above the insurance premium) or the stipulation that no one physician may draw more than a stated quota of funds collected by health insurance; on a group basis, such a measure would check any individual physician's incentive to earn more by providing more service.

Any country considering embarking on an extensive health insurance scheme is faced with a dilemma: the adoption of the fee-for-service mode of payment may lead to an uncontrollable spiral of costs; yet fee-for-service presents a useful "safety valve" even in nationalized services and a powerful incentive for physicians. There is evidence that the practice of paying directly for services may be growing in some countries with nationalized services or with complete health insurance coverage of the population.

#### EVALUATION OF HEALTH SERVICE PROGRAMMES

##### *Cost/benefit and cost/effectiveness analyses as tools of evaluation*

Choosing between different feasible courses of action calls for comparative evaluation of their respective advantages and disadvantages. The tools that economists use for such a comparative evaluation are cost/benefit and cost/effectiveness analysis. Both analyses measure inputs in the same way, i.e., as costs in monetary terms. They differ in their measurement of outcomes; cost/benefit analysis attempts to value all socially relevant outcomes in monetary terms, while cost/effectiveness analysis concentrates on one major desired outcome or benefit, such as health improvement or the reduction of the incidence of one disease, expressing the benefit outcome in terms of effectiveness, i.e. percentage reduction in the incidence of the disease rather than valuing it in terms of money. The price to be paid for the simplicity of cost/effectiveness analysis is that either cost or effectiveness has to be kept constant while the different options are considered, and comparative evaluation seeks to show which one of equally costly alternative policy actions is likely to be the most effective, or which one of equally effective policy actions is expected to be least costly.

In practice, cost/benefit analysis is mainly used to justify a particular health service programme or action. The difficulty is that most benefits, in terms of health and social development, cannot or should not be reduced to monetary terms<sup>a</sup> and that often action may be undertaken regardless of its cost/benefit ranking. Cost/benefit analysis is probably most useful for health programmes that have a major impact on economic development.

Cost/effectiveness analysis is particularly useful for evaluating different methods of attacking a single disease problem. Care should be taken, however, to ensure that lower costs do not mean loss of quality or reduce the effectiveness of the health service programme below a specified level, and that no major undesired side effects will result.

##### *Evaluation of medical care programmes*

Participants described their country's health services not so much in the usual organizational terms as in terms of distribution of resources and of patients within the major and subordinate components of the service and especially in economic terms, i.e., in terms of the effectiveness, efficiency,

<sup>a</sup> See subsection on the aggregation of health service benefits, p. 23.

interchangeability and required complementarity of these components. The discussion covered the relative role and cost of general practice as compared with specialist services, and inpatient care as compared with outpatient care. It was pointed out that the medical schools currently favour specialist and inpatient care and that consumer attitudes and social circumstances often combine to strengthen that trend. However, some doubt was expressed concerning the extent to which the organization and delivery of services are based on a real analysis of the facts.

Reasons for the increasing cost of medical care, especially for inpatient services, were analysed<sup>a</sup> and examples given of the judicious application of "engineering economics" leading to the use of more suitable and robust equipment thus minimizing both repair costs and the costs of nonutilization.

There was some discussion on optimal hospital size. Small cottage hospitals are clearly uneconomical but often favoured by patients, who like to remain relatively near their homes. The usefulness of regression analysis<sup>b</sup> in finding optimal hospital size was questioned; clearly the size of the market is important, as well as the type and mixture of service to be provided, but occupancy rates are unreliable indicators. In some cases waiting lists are the main guide to planning, but the concept of economy of scale is often overridden by political considerations. Real economies in hospital services can be achieved only by stricter attention to criteria for admission and for length of stay.

Another simple and specific example of a straightforward cost comparison discussed was the treatment of varicose veins by two methods assumed, on the basis of a study carried out in the United Kingdom, to be equally effective: the injection method, performed on outpatients, and surgery, which implies hospitalization. The injection method is obviously the less costly. However, one participant challenged the assumptions of this study. Patients with severe varicose veins treated by the injection method often have to return for surgery; so that the cost of cure, in terms of an episode, should be distinguished from the cost of a treatment, in terms of a single encounter. A participant further pointed out that surgery need not be on an inpatient basis, and that injections need not be given by physicians.

#### *The evaluation of other health service programmes*

*Schistosomiasis programmes.* One of the consultants presented a multiple regression analysis of the effects of schistosomiasis in St Lucia. No difference in productivity was found between banana workers who were infected and those who were not, nor did productivity vary with the load of schistosomal infection. Further, although more than half the population was infected, schistosomiasis appeared to have no significant impact on mortality, fertility, morbidity, and learning at school. The conclusion

<sup>a</sup> See also pp. 15-16.

<sup>b</sup> A statistical test of a scientific hypothesis that a given variable ("dependent variable") can be forecast if one or a number of other variables ("independent variables") are known.

was that programmes for the control of schistosomiasis do not carry a high economic justification for this island.

There was some difference of opinion on the analysis and its conclusions. One participant pointed out that effects should have been related to severity of illness or disease and not to infection, which may or may not result in illness. Another regretted that unemployed workers had not been included in the study, since employed workers are possibly the more energetic ones despite the schistosomal infection. He also considered that an analysis of the relevant behaviour of the target group over time (before, with, and after infection), or time-series analysis, would have given better results than the analysis of the behaviour of different groups within the target population at one point in time, or cross-sectional analysis. Against this it was argued that there was little unemployment in the island and that changes over time in other relevant variables, such as banana markets and employment opportunities, might have detracted from the reliability of time-series analysis.

*Cholera programmes.* The Seminar studied evaluations by the Organization of programmes for the prevention of cholera—regular vaccinations, *ad hoc* vaccinations, sanitation, chemoprophylaxis, and various combinations of such techniques.

The benefits of a cholera prevention programme, for the purposes of these evaluations, are the savings on additional costs of hospital treatment that would be incurred in the absence of the programme. Although these benefits were estimated by means of a detailed epidemiological model, they were only indicative because the data from endemic areas were insufficient and not always reliable. Indirect benefits in terms of reduced losses due to interruptions in tourism and foreign trade were not included. Costs for the purposes of these evaluations are the operating costs of a given prevention programme, excluding costs of surveillance and diagnosis. Both costs and benefits were estimated over a decade, but no attempt was made to discount them for these evaluations.<sup>a</sup>

Prevention programmes were evaluated in terms of both net benefits and cost per cholera case prevented. Programmes involving sanitation, alone or in combination with other techniques, were deemed to be most efficient. One participant pointed out that sanitation programmes may prevent other water- and filth-borne diseases as well and should therefore yield higher benefits than indicated. It was further pointed out that the treatment technique for cholera cases is equally applicable to cases of acute diarrhoea so that this group of diseases should be studied as a whole.

*Smallpox programmes.* An evaluation by the Organization of smallpox programmes was also studied. The great progress in smallpox control that has left only four areas endemic has been possible because of an effective, powerful and safe vaccine, an easy and rapid vaccination technique, and an effective organization of vaccination teams. The objective for the future

<sup>a</sup> For purposes of decision-making and evaluation, a discount or inverse interest rate can be applied to costs and benefits expected to accrue at different times in the future. The less immediate such costs and benefits are expected to be, the more heavily they are discounted.

is the interruption of transmission rather than total population coverage by vaccination, or the eradication of the disease. It will be worth while to pursue this objective throughout the next decade or so, because the value of the productive lives saved outweighs the programme costs.

The monetary valuation of lives saved and especially the estimates of increases in life expectancy were challenged. It was also pointed out that the costs of organizing the delivery of smallpox programmes were not included. It was stressed that the main benefits would accrue, outside the endemic areas, in the areas and countries which would be able to abandon compulsory vaccinations and port health surveillance for smallpox. Finally, on the question of maintaining cost/efficiency where smallpox control has been successful and the costs are therefore high per case prevented or detected, it was suggested that the cost/efficiency of single-purpose smallpox eradication teams could be improved by giving them other active health service responsibilities.

*Family planning programmes.* A framework worked out in the Organization for the evaluation of family planning programmes was studied. Four levels of programme evaluation were illustrated: internal activities (e.g., teams, buildings, supplies); service production (e.g., number of acceptors); demographic effects (e.g., mortality, fertility); and socioeconomic effects (e.g., employment, economic development). The problem is to find the cheapest way to prevent an "excess" of births. It was shown that the most efficient method varies from one country to another.

Family planning costs account for a high proportion of the health service costs in many developing countries but there are indications that these can be decreased by integrating family planning with maternal and child health programmes and by modifying the health service delivery strategy for different population groups.

It was pointed out that modern methods of contraception are relatively cheap but that motivating the target population to use them gave rise to the major costs of family planning. Motivation is the key to success and further study is needed to find out how far motivation is determined by socioeconomic variables and how much family planning is practised without modern equipment. One economic hypothesis was noted: that the family "demand" for children in rural developing areas is directly proportional to the risk of losing them (infant and child mortality) and inversely proportional to the cost of child rearing. The cost of rearing will, of course, increase with increasing opportunities for the employment of women.

*Malaria control programmes.* A malaria control evaluation scheme was submitted for discussion from the point of view of methodology, the data relating to several South-East Asian countries being used for illustrative purposes only. The costs of a malaria control programme were defined as the discounted operation costs, and the benefits as the discounted treatment cost and productivity losses that have to be borne in the absence of malaria control. The scheme submitted suffered from the disadvantage that instead of discounted costs and benefits, the costs and benefits in the

end year of the assumed programme were presented and compared in terms of a benefit/cost ratio.

It was pointed out that an economic evaluation of a disease control programme has to be based on a relevant epidemiological model, taking into account, for example, the resistance of vectors to pesticides. Furthermore, budget constraints have to be introduced. Some participants challenged the appropriateness of valuing premature death in terms of economic productivity loss rather than directly in terms of mortality and indicated their preference for cost/effectiveness rather than cost/benefit analysis.

The analysis was also criticized for attempting to answer the “all-or-nothing” question rather than suggest how much more or less control is efficient in relation to other programmes. The benefit/cost ratio concept was in this case found inferior to the concept of net benefit (i.e., value of benefits minus value of costs). A final criticism related to the omission of distribution aspects: costs and benefits can only be aggregated without further processing if the question which groups bear the costs and receive the benefits is of no concern.

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## CHAPTER 4

### CONCLUSIONS AND RECOMMENDATIONS

The participants in the Seminar were convinced that health economics could make a useful contribution to the promotion of world health, particularly if, instead of being taught and practised in isolation, its principles and techniques were incorporated into the wider fields of health service administration and management.

#### ACTION WITHIN COUNTRIES

Several participants indicated that they were both willing and able to promote the introduction of health economics into the health planning or health activities of their countries. Others intended to use the Seminar documentation as teaching material or to promote an awareness of health economics among senior health officials and decision-makers. Most participants foresaw that, once health economics has been introduced and has proved useful, its impact will increase. It was agreed that health economics could well be introduced into undergraduate curricula as well as those of trainees in administration at all levels and that suitable material could also be included in practical refresher or orientation courses for senior staff and decision-makers.

Work is already in progress in some developing countries on applications of health economics practice, including the development of new costing methods and the use of results for managerial purposes, and the Seminar recommended that these countries communicate to the Organization their methods and findings and the results of these applications.

It was also agreed that there is ample scope in many countries for savings in health expenditure—on, for example, the production and procurement of drugs or the design and equipment of hospitals—and that an economic evaluation of present practice could lead to substantial improvements.

#### ACTION BY THE ORGANIZATION

Recognizing WHO's acknowledged role in and responsibility for disseminating information, the Seminar suggested that it consider collecting and making available authoritative information or guidance material of certain specific kinds, including: lists of schools where training in health economics is available; training guides for health administrators and decision-makers (macro aspects, as outlined in Chapter 2 above) and for managers and executives of health service facilities and smaller projects (micro aspects, as outlined in Chapter 3 above); data on current rational spending on health; and information on where large-scale providers of health services can obtain the best value for money—in the purchase of certain types of drugs and equipment, for instance.

It was further suggested that the Organization consider providing direct assistance to countries needing economic expertise in health programming, in health service development, and in the establishment of health economics departments in colleges and planning institutions.

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### WHO INTERREGIONAL SEMINAR ON HEALTH ECONOMICS

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