HEALTH MANPOWER PLANNING:
Principles, Methods, Issues

Edited by

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Introduction

David Tejada-de-Rivero

With growing awareness not only that access to health care is a basic human right but that health is a valuable national asset, a primary aim of social development, and an essential means to sound economic and social progress, the crucial question that decision-makers at the highest level have to consider is not whether their country can afford to improve health services but whether it can afford not to do so.

A parallel realization is that achieving and maintaining health in a society is a task on a much broader scale than medical care and involves knowledge and skills beyond those available within the health sector and most certainly beyond those available within the health team as traditionally conceived and constituted. This is in no way to be interpreted as implying that the health sector did not, cannot, or should not play a crucial role in a country’s efforts to bring health to its people. It implies merely that, with a closer look at the past, a realistic view of the future, and a strong resolve to eliminate conflicts of interest, leaders in the health sector can achieve a more positive role for that sector—whose only justification is the improvement of health and whose survival will depend on its capacity to bring about such an improvement.

Since the health industry is essentially labour-intensive, manpower constitutes a critical component. This being so, one of the greatest challenges in the health field today is that of managing this manpower in a way that will make it less costly but yet fully capable of meeting what is a stated goal in most societies, the development of a more accessible, more equitable, more effective health care delivery system. This task involves more than a mere focusing on numbers, because manpower is a resource that can be used in a multiplicity of ways and the manner in which it is employed is as important as, and sometimes more important than its numerical supply. Health manpower planning is thus also concerned with the type and quality of education, the workplace, and the organization of health manpower. In essence, its objective is to provide the right type of education and training for the right number and type of people needed to render effectively and safely the right types of service when and where required by the population.

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Reshaping the health manpower complex so that it is responsive to a nation's requirements for health care is essentially a triple process involving planning, production, and management, with all three functions harmoniously geared to achieving the single goal of providing health services to the entire population. Unfortunately, more often than not this goal becomes lost in the mad scramble of institutions and professional groups to perpetuate themselves and in excessive preoccupation with input rather than output, with the efficiency of component parts rather than the effectiveness of the whole. The result of this is that the needs of the system acquire a higher priority than the needs of the people to be served.

* * *

The origins of this book go back to 1970 when WHO convened a Scientific Group on the Development of Studies on Health Manpower and requested it (a) to conduct a review of the development and methods of health manpower studies and (b) to recommend to WHO future lines of research. In its review the Scientific Group found that, despite the many attempts at health manpower planning in recent years, the abundance of data collected, and the often sophisticated methods employed, the impact on policy formulation and implementation seemed to have been relatively small. Moreover, the methods used were often inappropriate or the efforts sporadic and not adequately integrated into an ongoing health planning system related to socioeconomic plans. On the basis of these and other findings, the Scientific Group recommended that WHO should promote health manpower planning in Member States. The present publication is one of the responses to that recommendation.

It is also in consonance with the Twenty-ninth World Health Assembly's request (a) that WHO collaborate with Member States in the formulation of national health policies that are responsive to health service requirements and in the strengthening of health manpower planning as an integral part of overall health planning in the context of their socioeconomic conditions, and (b) that WHO intensify efforts to evolve the concept of an integrated process of health services and manpower development and to collaborate with Member States in the creation of a permanent mechanism through which the concept can be applied.

The purpose of the book is to bring together and analyse information on the various aspects of health manpower planning, to set out the principles of health manpower planning as an integral part of overall health planning in the context of socioeconomic development, to highlight the more common difficulties experienced in the conduct of such planning.

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and to describe the component parts of the planning process as well as the techniques that can be used, including their potential benefits and limitations. The book also focuses on selected key issues such as health manpower distribution, utilization, and migration.

The Scientific Group also expressed the view that there was an urgent need for supplementary manuals providing more specific guidelines on selected issues, and this recommendation was included in the Sixth General Programme of Work (1978-1983) of WHO. Accordingly, this book focuses primarily on planning principles and approaches but leaves the details of how to plan for subsequent publications. The preparation of guidelines in health manpower planning has already been initiated.

It is hoped that, besides those directly concerned with health and health manpower planning, health administrators, educators, policy-makers, statisticians, persons serving on health advisory bodies and, in the case of some chapters, legislators and members of the informed public will find this book relevant to issues with which they are concerned. The book is primarily directed towards the needs of the developing countries, but most of the principles and many of the techniques are also relevant in developed countries.

This book was prepared in full recognition of the fact that there are as many health systems throughout the world as there are countries, that each country is unique in its population structure, its patterns of morbidity and mortality, its cultural values, its political institutions, its resources, and its manner and level of economic development, and that each country has therefore to find its own particular path to better health. In doing so, however, it would do itself a disservice if it ignored the international experience and knowledge that have accumulated. In some countries the practice of health manpower planning has by now become a standard regular activity of the state and an integral part of health planning (e.g., the USSR and Eastern European countries), while in many other countries, both developed and developing, manpower studies have been carried out in the past two decades (Canada, Colombia, Peru, Sri Lanka, Thailand, Turkey, the United Kingdom, USA, etc.) and manpower plans have been prepared. While this volume does not claim to constitute the sum of such experience and knowledge in the field of health manpower, it goes a long way towards synthesizing current thought in this field and can thus be useful to each country, whatever its particular nature.

It is proposed to supplement this book by a second volume focusing on the specific experience of selected countries and particularly on planning styles in different sociopolitical settings.
CHAPTER 1

Health manpower planning: an overview

Alfonso Mejía & Tamás Fülöp

The Health Manpower Problem

In a study made in 1973, the WHO Executive Board expressed the belief that the average health care consumer received less care in that year than he had received 25 years earlier when WHO was created. Numerous spectacular advances have been achieved during the interval, as the Director-General of WHO said in the same year, such as an increase in life expectancy. However, the gains are almost entirely attributable to a reduction in mortality among the young through the mass application of public health measures and are of little benefit if most individuals cannot hope to receive a reasonable amount of health care during the additional years of survival. The reason for this failure may be found in the anomalies in present health care and health manpower planning.

A rational approach to health manpower planning could do much to obviate some of those anomalies. A few of the anomalies may be cited:

- A newly expanded regional hospital system, completed at great cost with a foreign loan on which commercial interest rates are paid, stands unused for lack of nursing personnel.

- Over half of the graduates of a ministry of health six-month training programme for environmental sanitation personnel were lost permanently to the health sector owing to failure by the ministry to create the necessary jobs in time.

- Health authorities in developing countries lament over the many physicians who emigrate following graduation while at the same time citing with pride the high pass rate of these graduates in licensing examinations in developed countries.

- Health and political authorities, in their desire to avoid providing rural communities with “second-class” health care, oppose the use of

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non-professional personnel in such areas, hence ensuring that the popula-

- The gift by a developed country of a modern university hospital
to a developing country has become a double liability to the recipient—
a major drain on its health budget and a teaching facility inappropriate
to local training needs.

- One government agency has funded the development of a large
number of training programmes for medical assistants, while another,
in charge of reimbursements for health services under the social insurance
system, has declined to approve payment for the services of these assistants
working under medical supervision.

- In order to cover the payroll of an overstuffed health system, the
budgets for drugs, equipment, and the maintenance of facilities have been
cut to the point where the productivity of the staff is severely compromised.

- Unwilling to jeopardize the "quality of care" by expanding its medical
school capacity to meet its national needs, a country has ended up by
relying on large numbers of immigrant physicians urgently needed in their
home countries and ill-equipped to practise medicine in the host country.

- Despite 50% of vacancies in the entering classes of the existing
three schools of pharmacy, a 50% student attrition rate, and a 50% loss
of graduates owing to insufficient market demand, a new school has been
opened and the duration of studies increased in order to "improve the
quality of training".

- Three different schemes for training and using peripheral health
workers are under development simultaneously but independently, each
competing for government support to be extended nationally.

- Over one-third of the people in one continent are without medical
care despite a reasonably good overall doctor/population ratio.

- Forty-two new medical schools have opened in one country in
four years.

These are actual anomalies occurring in both developed and developing
countries, though mainly in the latter. Similar examples of inadequate or
non-existent health manpower planning, with all their foreseeable tragic
sequelae—unnecessary human suffering, wasted resources, frustration,
and lost opportunities—could take up pages. These are not the actions
of stupid or malevolent persons, for health is one of the few fields where
everyone takes the same side—against disease—and the field is unusually
blessed with intelligent and highly trained individuals. Rather, they
are the result of such factors as the intrinsic complexity of the health
sector, the strong professional tradition that emphasizes individual and
institutional autonomy as against an integrated team approach to providing
care, distrust of planning and of planned change, and poor performance
in implementing such plans as are prepared. Combined with this has been a failure to grasp the manpower aspects of health care problems.

Good examples of effective manpower planning and use could and indeed will be cited later on. Their number is increasing rapidly as more and more countries come to realize the central role their human resources must assume in the fulfillment of national aspirations and plan accordingly.

The essence of the health manpower planning problem is what it has always been—that of trying to provide a supply of health manpower adequate to meet society’s increasing demand for health care. Recently this demand has been increasing especially rapidly in virtually all countries; high population growth, rising social expectations, and socioeconomic development stimulate the demand for more services, and advances in health technology and the shift in the pattern of disease from the acute illnesses of youth to the chronic illnesses of the aged stimulate the demand for a greater variety of services.

The rapid growth of the health industry, particularly in a few highly developed countries, has led to a demand for health manpower from outside those countries. As a result certain categories of health professionals have become, as it were, international commodities that are moulded in an educational pattern for the most part designed to serve the needs of industrialized societies in the Western world. This situation has important implications for health manpower planning and development in developed and developing countries alike.

The main failure of the health systems in many countries is their inability to provide the basic types of health service needed by the population as a whole. Thus, while a few segments of the population may be well served, the majority are served poorly or not at all. That this situation is both untenable and preventable is becoming apparent to an increasing number of people.

This situation is the result of many factors, the main one usually being the low priority given to health care among the various measures taken to promote social and economic development. But while this may be the greatest constraint, the onus of failing to make the health system work for the benefit of the population as a whole lies directly on the health system itself. Within that system, the problem is compounded by the fact that its components function largely in isolation from each other. The result is a fragmented approach that leads to policies, plans, and activities that overlap wastefully or conflict with each other and, in many instances, tackle the wrong problems.

The lack of manpower and of other resources is the most obvious constraint to the development of the health sector. Within the health system the health manpower component accounts for the major part of
the budget. Yet most countries, however developed they may be, appear to experience a dearth of health workers. This shortage, compounded by inefficient utilization of the health workers that are available, serves to highlight the urgent need to define the functions and tasks to be performed and the type of preparation and amounts of manpower needed to carry them out. This calls for close coordination of two major components of the system: health care delivery and health manpower development. Unfortunately, such coordination is lacking in most countries, resulting in the fragmented approach mentioned above.

One result of this situation is the irrelevance of services to the priority needs of people, as manifested by excessive emphasis on the cure of disease in individuals as opposed to the preservation of health in the community. Whether this is a consequence of the dominant position that physicians have traditionally held in the community or a cause of that dominance is open to question. Whatever the case, private sector health services in many countries have been permitted to grow out of all proportion. At the same time, the overshadowed public sector continues to overemphasize expensive hospital care, which caters primarily for a part of the urban population, usually the richer part, at the expense of the rural population and the urban poor.

Lack of coordination exists not only between the two major components of the health system but also among the subsystems within each component. In relation to health manpower, the lack is visible in the gap existing between manpower planning and manpower production, administration, and management. Each function, however sophisticated the methods used, tends to proceed independently of the others, with detrimental results for the health system as a whole.

The role of manpower planning

Manpower is the critical resource in a labour-intensive industry such as health. Important as it is, however, manpower is only a means and cannot be considered an end in itself, since it is health services and not manpower that people demand. Furthermore, while it is a necessary resource input, it is by no means the sole one. Health manpower is thus at one and the same time an integral part of and a subsystem within a country's health system. It is an organic element among the resources needed for the overall national health plan aimed at improving the quality of life of the entire population.

Manpower requires the longest preparatory period of all the health resources and cannot be improvised. It is also subject to a certain inherent inertia, in that the rigidity of the health and education systems and the attitudes of health workers do not make for easy mobility or conduce to
improving geographical and occupational distribution. Nor can manpower be stored or discarded. If it is to be available at the proper time, it has to be planned for in advance in the right amount and type—no more and no less than is needed. Because they are subject to obsolescence, manpower abilities and skills also need to be maintained by means of permanent supervision and continuing education.

The complete absence of health manpower planning or bad planning has led to acute shortages of services in some countries and areas and to surpluses and imbalances in others. Some countries produce more health workers than they can economically absorb, while others appear to have an insatiable appetite for them within a situation of underproduction relative to effective demand. This leads to the immigration of certain categories of manpower. The imbalance between the supply of and the demand for health manpower is a result of a basic lack of coordination between the providers of health services on the one hand and the producers of health manpower on the other. Health manpower is not a commodity whose production can be left to the imperfect functioning of laissez-faire market mechanisms.

**Health manpower planning in perspective**

The explicit, comprehensive application of planning techniques to the solution of health manpower problems is a relatively recent phenomenon, even though implicit planning has been in existence for many years, especially in the socialist countries. It is only in the last decade or so that countries have sought deliberately to link their training plans with the needs of the health sector. In the Soviet Union, which has one of the longest experiences of health manpower planning, in the mid-1950s planning became primarily oriented towards meeting service needs instead of being primarily related to medical school and other health training institution capacities. The situation is similar in the other socialist countries as well. In the West, planning tended to be episodic, crisis-oriented, and often limited in scope. In the last few years, however, planning studies have become popular, aided by rapidly evolving survey techniques and computer-assisted analysis, but the national capacity to use the new information for decision-making, policy formulation, plan implementation, and evaluation has lagged behind the developments in methodology. Moreover, all too often imbalances have developed in the amount of information collected on different aspects of the manpower situation, most notably between supply and demand. These imbalances in turn have weakened the overall effectiveness of planning efforts and tended to discourage those involved in them.

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Since 1948 WHO has provided extensive assistance to its Member States in areas related to health manpower, such as in promoting statistical indices, collecting morbidity, mortality, facility, and manpower data, training health personnel, and developing guidelines for national health planning. Widespread concern about the supply and effectiveness of health resources has led various countries to undertake national health manpower studies of one or more occupational categories, and WHO has received an increasing number of requests for assistance with such studies. WHO has also organized a series of meetings in its different regions for the exchange of views on health manpower planning and related topics and for the assessment of the experience so far gained in this domain.

A recent development in health planning, and therefore implicitly in health manpower planning, has been the country health programming concept. This involves the systematic assessment of health problems in their national context, the identification of areas susceptible of change, the determination of the methods and resources best suited to bringing about change, and the fixing of responsibility for providing the resources. The resources may be national or originate from sources external to the country (including WHO), but the overall responsibility remains that of the country concerned.

The approach to country health programming involves an intensive effort of familiarization, communication, and planning spread over a short period of time, usually in the form of workshops utilizing a multidisciplinary team of national and international experts. This is supplemented by the development of a health project formulation "package," a programmed approach to health project management including manpower management.

1 Countries that have undertaken significant recent work in health manpower planning include: Argentina, Bahrain and the United Arab Emirates, Bulgaria, Canada *, Chile *, China, Czechoslovakia, Colombia *, Cuba, Ecuador, France, German Democratic Republic, Hungary, India, Indonesia, Israel, Nigeria, Peru *, Poland, Philippines, Republic of Korea, Sri Lanka *, Switzerland, Thailand, Turkey *, United Kingdom, United Republic of Tanzania, USA, USSR, Viet Nam, and Yugoslavia. (Those with an asterisk have completed and published comprehensive studies.)


Basically in the form of a manual, it offers health planners and administrators a set of procedures for planning and implementing health projects, spelling out exactly what has to be done and by whom at each stage.

Despite the great variations between countries in the scope, methodology, and sophistication of manpower planning, several lessons have emerged from experience that appear to have wide applicability. These lessons, which will receive considerable attention in this book, include the following:

(1) planning is unlikely to be effective if due account is not taken of the social, economic and, especially, political circumstances in which it takes place;

(2) health manpower planning is an integral part of comprehensive health planning and should not become an independent activity;

(3) the three components of the health manpower development process—planning, production, and management—must be brought into closer and more functional relationship with each other and with health services development if manpower policy is to be implemented;

(4) manpower studies or reports of commissions, however sophisticated, do not necessarily lead to the development, much less to the implementation of a plan, or to an integrated process of health manpower development unless the necessary social, economic, and political conditions and a definite national political will are present.

The Planning Process

Definitions and objectives

Planning is the administrative instrument that provides a rational basis for decision-making. When aspirations exceed resources choices must be made, and if decisions are to be made intelligently and productively they must be based on a careful assessment of options. Perhaps the most important contribution planning can make is in the allocation of scarce resources so as to ensure that health services are made available equitably.

Planning involves:

— the identification and analysis of problems,
— the formulation of alternative options,
— the selection of the appropriate solution,

1 Health manpower cannot be produced, but the conditions for its development can be created. It is in this sense that the word "production" is used here and in the rest of the chapter.

— the determination of the technical methods to be used, whether in the form of services or of physical changes,
— the definition of programme objectives and of the future action to be taken.

Plans need to be spelled out by programming, i.e., by a detailed allocation of tasks and resources and a detailed description of methods of implementing one or more specified objectives within a given time. Planning and programming provide the basis for programmed management which, in health services as elsewhere, involves:

— obtaining the human and financial resources necessary to implement the chosen plan,
— defining the tasks (of organizations as well as of individuals and groups) in such a way as to make use of the available skills,
— developing and increasing skills and capabilities,
— motivating people to accept the objectives and to work towards them by the chosen means,
— monitoring, controlling, and evaluating so as to adjust the methods chosen in the light of experience.

Planning and management interact in practice. Communication and decision-making are necessary for both planning and management, and information is an essential ingredient of each. Certain basic definitions are presented below.

*National health planning* is the process of defining community health problems, identifying needs and resources, establishing realistic and feasible priority goals, and setting out the administrative action required to reach those goals. It is an integral part of *national planning for socio-economic development* — a continuous, systematic, coordinated process for the utilization of a country's resources in manpower, money, and materials for formulating and achieving social goals and development. It involves the combination of sectoral plans for health with those for education, agriculture, industry, public safety, transport, etc.

The term "human resources" has been used interchangeably with the term "manpower", but it may also be defined in broader terms. *Human resources* comprise the skills, knowledge, and capabilities actually or potentially available for the economic and social development of a community, whereas *manpower* is usually restricted to persons who have received, or are receiving, education and training for specific occupations.

The concept of *health manpower* generally includes: the number of individuals available for, and undergoing training in, the different health occupations; their demographic characteristics; their social characteristics
in terms of education, experience, and values; and the changes of personnel required, both in numbers and qualifications, to provide the health services needed or demanded by a population. As generally understood, therefore, health manpower includes: (1) those health workers already working in the field of health services; (2) potential health workers, i.e., those who have the requisite training or experience to engage in a particular health occupation but are not at present doing so; and (3) prospective health workers, i.e., those who are receiving the education and training that will prepare them for employment in the health sector. Each member of the health team has his or her own job, consequently job satisfaction, job descriptions, job assignments, job analysis, and job evaluation come into the picture. Job performance can be assessed by what has been variously defined as functional work studies, work sampling, and activity studies.¹

The health manpower development process of a country embraces all the basic functions involved in the planning, production, and management of health workers. The agencies involved in this process and their terms

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¹ Hojat, S. Glosarry of health care terminology. Copenhagen, WHO Regional Office for Europe, 1973 (Public Health in Europe, No. 4).
of reference, resources, and constraints constitute an integrated system—the health manpower system of that country, as shown in Fig. 1.

Health manpower planning is the process of estimating the number of persons and the kind of knowledge, skills, and attitudes they need to achieve predetermined health targets and ultimately health status objectives. Such planning also involves specifying who is going to do what, when, where, how, and with what resources for what population groups or individuals so that the knowledge and skills necessary for adequate performance can be made available according to predetermined policies and time schedules. This planning must be a continuing and not a sporadic process, and it requires continuous monitoring and evaluation.

As an intrinsic element of the health manpower development process, health manpower planning is also concerned with the production and management of health workers. It is an essential component and an integral part of national health planning which, in turn, should take place within the framework of national planning for overall social and economic development. The three are indeed interrelated processes. In other words, health manpower planning is not a subject in itself but must, if it is to be effective, take place within the context of overall health and development planning. It should, therefore, be based on the overall national political framework, health policies, and plans. Manpower requirements are thus derived from a health plan that sets forth the services needed or demanded by a defined population within a specified period.

Confusion sometimes exists between health manpower planning and the execution of a health manpower study. These are not synonymous. Health manpower planning is the process described above, of which the health manpower study is but one phase. Manpower studies usually concentrate attention on certain aspects only of the health manpower planning process, specifically data collection and analysis, perhaps combined with the preliminary formulation of alternative plans. The execution of a health manpower study in no way guarantees implementation of the recommendations made; many studies have had little influence on other than those directly involved in carrying them out.

The goal of health manpower planning is to ensure the provision of the most economical combination of the manpower skills needed for the effective, efficient, and safe delivery of the health services that can be provided within the available resources. The optimum solution in this sense is not that which includes the highest proportion of health professionals, but rather that which uses manpower whose qualifications are in accordance with the needs and demands of the services provided to the population at a cost compatible with the resources of the country.
Stages of the planning process

At this point it may be useful to describe the stages of the planning process that planners and other health authorities must go through as they carry out their responsibilities. This process is both dynamic, in that it must continually respond and adapt to a changing situation, and cyclical, in that it must progress through repeated stages of data collection and analysis, plan formulation, implementation, and evaluation. Fig. 2 shows the major stages typically included in the planning process. For the most part, the component elements of each stage are self-evident from the figure, though some additional explanation of each stage may be useful. Later chapters look more closely at the prerequisites to and political dimensions of successful planning.

Stage 1. The initial impetus for starting the health manpower planning process may come from almost any source, including one outside the health sector such as the national planning office or ministry of education; but most commonly, the process is either started by or is supported early on by the national health authorities. Once the process is well established, Stage 1 serves rather as a source of new ideas, fresh concern, or political pressures that re-energize the planning effort.

Stage 2. This stage is crucial for the success of the whole planning effort. Even before the planner begins his preliminary review of health priorities, data availability, and the health situation and system, he needs to establish the existence of at least the minimal prerequisites for effective health manpower planning. If the prevailing circumstances suggest that the chances of carrying out effective comprehensive planning are slight, he should direct his attention towards more modest objectives and seek to improve the prospects for planning.

Stage 3. At this point it becomes necessary to quantify the planning problem, to draw up an inventory of resources and their use, and to make projections of population growth, manpower production, and other relevant factors. It should be said that health manpower planning, at least initially, could always be based on what data exist.

Stage 4. The emphasis here is on proposing a wide variety of alternatives and then, taking into account such diverse factors as feasibility, acceptability, effectiveness, cost, and the impact on other aspects of the health system, selecting the options that seem most appropriate under the circumstances. It is also important to ensure that the chosen policies are congruent with other sectoral policies and plans relating to health, employment, education, research, and so forth.

Stage 5. For implementation to be successful, plans must be converted into detailed programmes that itemize the activities to be carried out, the
methods to be applied, the resources to be used, and the costs involved as well as specify the timing of each operation. The overall plan needs to be split into regional (subregional) programmes and specific projects. The continued commitment and participation of all those whose involvement was sought during the early stages of planning should be ensured.
Moreover, the plan should make due allowance for the management skills necessary—and available—for its implementation.

Stage 6. The evaluation stage of the planning process is all too often neglected, particularly in a field such as health manpower planning where there tends to be a long latent period between the decision to act and the results of such a decision. In fact, the length of the latent period makes ongoing evaluation even more important, since it is only by evaluation that the planner can make mid-course corrections that will allow him to avoid the perpetuation of planning errors made years earlier.

The stages described above are more or less identifiable in most health planning processes, but the emphasis on one stage or another varies between countries and over time. The cycle shown in Fig. 2 is rotating, involving a continuing chain of stages, events, and activities (though not necessarily in sequential order). Each link in this chain is activated by the one that precedes it and contributes to the subsequent one. The cycle also implies the existence at every stage of a mechanism of feedback to the evaluation process described above.

Prerequisites to planning

The need for health manpower planning may be manifested by, among other things, economic concern about the financial implications of both training and the utilization of those trained, scientific concern about the quality of the health services provided, or social concern about the unequal distribution of services. Political and technical considerations may also enter into the picture. Whatever the motives, however, for embarking on health manpower planning, for it to be effective certain prerequisites are required, conditions under which the process becomes feasible and the plans become easier to implement. The extent to which these conditions are fulfilled will indicate the chances of success in establishing a health manpower planning process that is not confined to the implementation of a health manpower study. Among the conditions are the following.

1. Leadership readiness for and commitment to change. The preparation of a national health manpower plan must be solidly based on clear and sustained directives by the relevant health, education, and manpower authorities. The degree of awareness among health and educational leaders in relation to the quantity, distribution, utilization, functional imbalance between different categories, and other health manpower issues should be assessed, for without such awareness and the necessary support the whole process of planning will at a later stage most probably end in defective, partial, or perhaps no plan implementation.

2. Enabling legislation for planning and subsequent plan implementation. Unless the willingness of decision-makers to promote change is reinforced
by legislation and administrative regulations, health manpower planning is likely to have only a limited effect.

(3) Administrative capacity and willingness to implement the plan. If the plan is to be at all realistic, it must take account of administrative limitations. Dearth of experienced administrators accounts for the limited success achieved in implementing many health manpower plans.

The political dimension

Health manpower planning involves political decisions and depends on the kind of political system in a given country. Plans must be formulated on the basis of the prevailing policies and legislation, which concern many sectors other than health. The policies, resources, and constraints of those sectors must be taken into consideration if health manpower planning is to be realistic. Policy decisions, too, are made not only at the national level but also at subnational and local level and even at institutional level. Identification of the policy-making sources and understanding of the rational bases for policy decisions at each level are crucial both for health manpower planning and for implementation. The relative weight given in decision-making to political, economic, social, legal, and technical considerations greatly influences the design of the plan and the strategy for its implementation. One of the hardest tasks facing the health manpower planner is to reconcile all these different approaches and develop manpower policy options that are consistent with other social and economic policies. Relating health manpower production to a country's needs and policies is not easy for various reasons, some of which may be outlined.

(1) Social policy and national goals, including health policy and health goals, may undergo substantial changes from year to year. Furthermore, the fact that policies and goals may be politically acceptable or even desirable does not necessarily mean that they are socially relevant. Adverse conditions in some countries may militate against successful health manpower planning. However, as with the development process itself, the minimum conditions that must be satisfied before planning is started should not be set too high or nothing will be done.

(2) Social objectives and goals are not single and unidirectional, but multiple and often inconsistent and competitive. Moreover, subsystems at various levels within a country serve different, often competing, interests and groups.

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1 For supplementary information and references on the topics of the prerequisites to planning and on the political aspects of health planning see: Hall, T. L. The political aspects of health planning. In: Bawum, W. A., ed. Health planning: qualitative aspects and quantitative techniques. Baltimore, Johns Hopkins University Department of International Health, 1972, p. 77-95. Also Carter, D. A. & Lir. P. R., ed. Politics of health. New York, McGraw Hill, 1972. The latter has chapters on various aspects of the political process as it relates to health and includes examples from the United Kingdom, USA, and other countries. See, too, Fyok, G. A. Problems vyrashchiva zdrav'ya. Moscow, Meditsina, 1974.
(3) Goals of social systems are usually only implicit, and it is difficult to make them explicit for purposes of policy analysis.

(4) There are gaps in the awareness of social problems, in information, and in planning. Social system leaders are often unclear about how goals relate to each other and about the potential consequences of alternative courses of action.

(5) Problems tend to be perceived and acted upon singly, symptomatically, and in an uncoordinated manner by separate groups and decision-makers.

During the early phases in the planning cycle there need to be inter-agency and, not infrequently, intersectoral consultations that lead to arrangements, both formal and informal, for implementing planning. This means linking the technical and the political processes and implies knowledge of the types of decisions made in relation to health and manpower planning by leaders and members of the legislature, political executives, control agencies, socioeconomic planners, health administrators at different levels, health planners, educators, programme advisers and managers, and other professional bodies and staff. These consultations, so critical during the early phases of the manpower planning process, need to be maintained on a continuing, though perhaps less intensive, basis to ensure successful plan implementation. The skills necessary to carry out this aspect of planning are just as important for success in planning as those concerned with the technical part of planning.

The statistical basis of manpower planning

The collection, analysis, and management of statistics constitute a major responsibility of the manpower planner. Indeed, with the growing popularity of health manpower planning studies in recent years, planners have frequently found themselves in vast data-gathering operations where the amount of information collected has greatly exceeded the capacity of planners and decision-makers to digest and make adequate use of it. This section considers certain general principles of relevance to the statistical aspects of manpower planning, lists briefly the information of potential relevance to planning, and suggests a way in which planners can quickly and economically test the validity of their plans for the collection and use of data. Subsequent chapters cover data requirements for specific aspects of manpower planning. It should, however, be again stressed that health manpower planning can be started on the basis of the existing data.

1 Based on: Schaper, M. *Evaluation/decision-making in health planning and administration.* Chapel Hill, University of North Carolina, School of Public Health, Department of Health Administration, 1973, p. 43 (HADM Monograph Series, No. 2).
Guiding principles. Past experience suggests the validity of the following six principles for the collection and use of technical data for manpower planning.

(1) Health manpower statistics should be integrated with the statistical systems for health and education. More and more countries have started to plan in recent years, and many have found that their statistical systems for health and education, marginally adequate for the routine management of those sectors, are unable to meet the data needs of comprehensive health planning, especially in relation to certain aspects of health manpower planning. As a result, some countries have created a data collection system largely or completely independent of the regular statistical systems. While this approach may be justified early in a country’s manpower planning, it should not be perpetuated; as soon as is feasible, responsibility for the collection of basic manpower data should be assigned to the regular statistical systems for health and education. Special data requirements involving detailed studies of an ongoing or periodic nature can occasionally be met within the regular government statistical system or, more frequently, special arrangements can be made with institutions better suited for such work.

(2) Statistical specialists should be involved throughout the planning process. Manpower planning requires a team approach, not only for the practical reason that the implementation of the plan depends on the understanding and support of many groups with different interests but also because many different skills are needed to collect and interpret the manpower data. Statistical skills are especially important, and full use of specialists should be made throughout the planning process.

(3) Manpower data requirements should be kept in line with the capacity of the statistical system. Almost inevitably manpower planning will extend the capacity of a national statistical system to the utmost, but planners should guard against allowing their data requirements to exceed their country’s capacity to meet them.

(4) The different study components should be well balanced. Manpower planning efforts are frequently prolonged or wasteful because of imbalances in the data requirements for different study components. For example, there is little merit in having costly detailed supply projections if the corresponding projections of requirements use an extremely crude technique subject to a large margin of error.

(5) Data should have an evident bearing on decision-making. This principle appears obvious but is often ignored in practice. Special studies

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should be undertaken only if preliminary analysis suggests that their findings will be relevant and will contribute to the identification and discussion of a problem that can be solved.

(6) *Preference should be given to data quality and representativeness rather than to coverage.* Those concerned with manpower planning will be far better served by having relatively detailed and accurate information on a sample of students, practitioners, health training institutions, health institutions, etc. than more limited data subject to high non-response and error rates on all the population or institutions under study. Nevertheless, the temptation to achieve a broad coverage and lack of familiarity with sampling techniques have led many planners to ignore this principle.

*Data requirements.* A WHO Scientific Group on the Development of Studies in Health Manpower recommended the development for manpower planners of a detailed list of the information required, perhaps supplemented by model questionnaires that had been satisfactorily field tested under varying conditions. As an initial effort in this regard, the Scientific Group included in its report\(^1\) a list of the major information categories it considered potentially relevant to manpower planning, discussing the special significance of, and the problems associated with, each category. These categories were more a checklist of items for possible inclusion in the data collection design than a mandatory list of minimum requirements, and indeed, depending on the planning approach and the specific problems to be studied, some are of little or no relevance. The report of the Scientific Group includes supplementary comments on the potential uses and limitations of these information categories, which are listed below.

(1) *Demographic data*
Present and projected population by age and sex
Population density and distribution
Migration
Life expectancy
Present and projected birth and death rates

(2) *Economic information*
Patterns and tendencies regarding national, health sector, and personal income and expenditures
Cost of providing health services and of maintaining the different manpower categories
Cost-effect estimates for selected health programmes

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Employment rates and distribution according to major occupational groupings

Health insurance benefits

(3) Health status and needs
Mortality and morbidity data according to major causes, age, sex, and geographical distribution
The extent to which the leading causes of death and illness result in a demand for health care and in disability
Environmental, nutritional, cultural, and other factors affecting health status

(4) Use of health care services by the population
Health services used (or “met” demand) according to number, types, quality, and effects
Characteristics of users, including their attitudes and knowledge regarding health services use and the health system that provides them
Approximate volume of services desired (and/or needed) that are not obtained, according to type of service
Characteristics of those who desire (and/or need) services
Reasons for not obtaining desired (and/or needed) services

(5) Health manpower supply
Data, by manpower category, on the number, activity status, sex, age and/or year of graduation, work, geographical location, and specialty qualifications of personnel

(6) The health system and health manpower utilization
Data on the number, size, characteristics, and distribution of health facilities, on their staffing patterns including job vacancies, and on their functional interrelationships
Data on the diverse aspects of health manpower productivity, functions in different settings, and institutional, organizational, and legal contexts within which health personnel are active

(7) Health manpower training
Quantity and quality of applicants for training
Enrolments by year of study
Institutional objectives and orientation
Duration of study
Number and qualifications of teaching personnel

1 In some cases it may be necessary to obtain a disaggregation of applicant and enrolment data according to such additional variables as sex, ethnic origin, linguistic group, and residence.
Actual and potential capacity of training institutions
Student attrition and repetition and their major causes
Data on past graduates and the revalidation of foreign-earned degrees
Training costs
Content and organization of curricula

(8) Health manpower planning in the national context

Information about (a) planning bodies, professional organizations, educational and service institutions, and consumer and political groups interested in health manpower and health services; (b) non-health sector requirements for trained manpower; (c) the present government's policies, priorities, and time remaining in office; (d) long-range development plans and prospects; and (e) administrative capacities and constraints.

Validating the design for data collection and use. The data collection and analysis phases of a typical health manpower planning effort can take two or more years to complete, especially if work of this kind is not yet part of an ongoing process within a country's health system. As many as 40 or 50 different studies of specific topics may need to be undertaken and, since planning personnel and others concerned are often new to this type of work, the overall study design tends to be developed over the course of several years, planning personnel become trained on the job, and coordination of the various component parts of the data collection effort is difficult. To minimize these problems it may be useful to run the study in an abbreviated form through all of its multiple aspects during the course of a few weeks or several months. During this time the following activities are carried out.

(1) The overall study design and data requirements are specified in preliminary form.

(2) Draft tables are prepared to show both the presumed data requirements and the desired cross tabulations.

(3) National and international reports, studies, and other material on health manpower topics are reviewed, and extracts are made of whatever is relevant.

(4) The more important draft tables are completed, using either actual data drawn from previous studies or statistical reports or, where actual data are not available, hypothetical data based on reasonable estimates of the situation. Where accurate information is not yet available on such points as manpower losses or visits by doctors, reasonable estimates can be made and used in tables essential to the central planning objectives.

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Rarely will approximate information based on experience be so inadequate that the margin of error exceeds 25-30%.

(5) The major policy implications of the preliminary supply and requirements projections are identified and the feasibility of dealing with them reviewed. For example, if in the preliminary estimates a large gap between the supply of and demand for professional nurses seems likely to create a problem, the feasibility of closing the gap by means of various policy alternatives is considered. The alternatives could include reducing student losses, increasing the student intake, reducing the frequency of early retirement, attracting nurses out of retirement back into active practice, and substituting other personnel.

The advantages of such a mini-study are numerous, and it could accelerate, abbreviate considerably, and make more efficient the data collection and analysis phases. The main benefits of this approach are:

- It provides an opportunity to test the relevance and feasibility of the overall planning approach.
- It ensures that each data or study component is compatible with all other components and with the overall planning approach.
- It makes it possible to determine the degree to which the supply and requirements projections are subject to errors in the various data inputs.\(^1\)
- It avoids unnecessary data collection by making the maximum use of the information already available.
- It enables planning personnel to become familiar with the overall planning approach and gain practical experience with the constituent activities before embarking on detailed field studies (if needed).

- Most importantly, it provides decision-makers with a chance to visualize early on in the planning process the potential implications of the study's findings on policy. This in turn allows them to inform planners that certain recommendations would not be feasible, or that justification not originally contemplated would be necessary, or that additional work should be done to explore alternatives. Moreover, the decision-makers can begin to become committed to and involved in the difficult process of change. Initiation of an early dialogue between planners and those responsible for policy could be a decisive factor in improving the utilization of manpower planning studies.

\(^1\) For example, the planner can increase by an arbitrary 10% the value ascribed to one of the bits of information that go into making a supply projection in order to determine the corresponding impact on the final projection, then repeat this process with each of the other information items. Once the planner identifies which data inputs have the greatest effect on the final projections he can give them preferential attention later on during the field studies to ensure the requisite accuracy.
SUMMARY

Health manpower planning is a process whereby health manpower development goals, objectives, priorities, and activities are established systematically in order to ensure that current and future health manpower resources meet adequately the requirements for delivering health services to a population. It consists not merely in projecting the numbers of personnel required but also in planning to provide properly designed health services with the quality and quantity of the personnel they need.

There is hardly a single nation which, if it applied properly those health resources and techniques already available to it, could not accomplish major improvements in the health care provided to all its citizens, even to those living in the most remote areas of the country. The wide gap between what is and what could be is the challenge that confronts all health workers, and the main reason for the gap is the inefficient and all too often inept utilization of human resources to the existing health problems. While further advances in health technology must await laboratory and clinical research, knowledge of how to increase manpower productivity is already widely available, though not adequately applied. The central concern of this book is therefore with manpower in the health services delivery systems, with assisting planners, administrators, policy-makers, educators, and consumers alike to maximize the effectiveness and efficiency of their activities inasmuch as they relate to human resources.

The lessons of recent decades are clear. This chapter singles out some of the more common problems that have confronted planners in the past in the hope that awareness of them will be useful in avoiding pitfalls in the future. It also provides a schematic representation of the stages that form part of the planning process and makes specific suggestions regarding the collection, analysis, and management of statistical data. A constant theme is that health manpower planning cannot be carried out in a vacuum but must take part within a larger system comprising other related components such as education and manpower management. Health manpower planning is thus placed within a wider context and the linkages between it and the political process, socioeconomic development, and health planning are brought out.

Countries or areas that have completed and published comprehensive health manpower studies include the following:

Canada

Chile

China (Province of Taiwan)

Colombia

Peru
Sri Lanka

Turkey
CHAPTER 2

The health manpower process

Alfonso Meza

The Planning Environment

The health sectors of most countries have grown into large and complex organizations that rarely function as a coordinated whole, and there is an increasing awareness that their management could be greatly improved by the application of techniques originally developed in fields other than health. Neither the problems of management nor the techniques proposed are new. In relation to the health manpower process, what is new is the appreciation of the environment within which such a process takes place, of the need to adapt and apply modern management methods to problem-solving, and of the need for a new framework within which the entire health manpower process is regarded as a single integrated system.

The scope and organizational context of the health manpower process vary greatly among countries, reflecting differences in the degree to which planning is centralized, in experience and capabilities, in health services and educational policies, in personnel systems and, in general, in the country’s style of government and political milieu. For most countries the central problem, however, lies in the almost complete dichotomy between the health service process and the health manpower process. Moreover, even within the health manpower process the constituent parts — planning, production, and management — are often poorly coordinated. Thus, manpower production may bear little quantitative or qualitative relation to health manpower plans — to the detriment of personnel performance.

Any health manpower system involves a complex and never-ending process of decision-making in which many diverse persons and institutions take part. These decisions are seldom made singly but rather form part of a logical sequence that provides them with a historical background and forms the basis of future decisions. Moreover, the decisions are as much, or more, influenced by political, cultural, and ideological considerations as they are by supposedly rational factors such as cost-benefit or the available technology. This makes it necessary for health manpower
experts to apply their administrative and diplomatic skills so as to encourage decision-makers to subordinate to the greatest degree possible their own individual preferences and their own parochial interests. The greater the number of persons and agencies involved in making decisions, the greater the need for effective coordination and communication.

The health manpower system of a country is the result of a complex process of decision-making that has existed over a long time. The way in which decisions were made in the past will be reflected in the system as it exists today. The system will not be the same if in the past decisions were made separately by each of the bodies that make up the system as it would be if decisions had been made with the aim of an optimum overall functioning of the system. Decisions that optimize the efficiency of a single area of the system may not lead to the most effective functioning of the whole system.

The multidisciplinary nature of many of the problems of concern to health manpower experts obliges them to become involved in a wide range of activities, which generally extend horizontally over several systems and vertically within each system over several functional levels. There are intrasectoral and extrasectoral relationships of the health manpower process at different administrative levels, relationships that vary widely in intensity and tend to defy ready categorization, there being within each level many people and many activities. The process involves the health and educational systems and certain other areas of the public sector, including labour, finance, and the legislature. As a prelude to considering health manpower system responsibilities and distinguishing characteristics, the next section examines the scope of the health manpower process, which determines the environment within which such a system must operate.

The Health Manpower System

The health system itself can be defined in various ways, but it is perhaps best described as the mechanism that transforms a society's general resources (knowledge, personnel, and capital) into special services aimed at meeting that society's health problems. It includes all of the society's institutions, activities, and efforts related to the health of its people. In this chapter, therefore, the health system is viewed as a whole, a complex composed of interrelated and interdependent components.

The health system has both static and dynamic elements. In the past, the tendency has been to concentrate on the static or material elements—

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1 Field, M. G. The concept of the "health system" at the macro-sociological level. Social Science and Medicine, 5:783-793 (1973).
hospitals, beds, physician/population ratios, etc.—because they are tangible or can easily be expressed in terms of numbers, to the detriment of the dynamic elements—such as policy-making and decision-making processes, staffing patterns, and standards of performance—and of their relationships to social and political theory.¹

The health manpower system is a subsystem of the overall health system and comprises all the interacting policies, structures, and mechanisms related to the planning, production, and use of health manpower independently of administrative alignments or organizational affiliations. The system is large and involves many agencies and agents, and it is indivisible because each element is essential to the proper functioning of the whole. Although there is an intricate network of connexions between its component parts, not all the connexions may be readily apparent.

The flow of information, resources, and decision-making between the static and dynamic elements is activated by the health manpower process, which embraces all the basic functions involved in the planning, production, and use of health workers. Fig. 3 shows the network of relationships and communication linkages of the health manpower process in simplified form.

The health system and hence the health manpower subsystem are transforming mechanisms. The raw materials of, or inputs into, the mechanism can be divided into policy inputs and resource inputs. Policy inputs may emanate from:

- the political system, which may exert its influence through formal legislative or executive procedures or, as is frequently the case, through the informal political influence of individuals and organizations in the system;

- the educational system, including both the public and the private sectors, which control basic education as well as professional training and influence, and perhaps control, the manner in which health manpower is produced and subsequently used;

- professional bodies, which have a considerable impact on health manpower production and utilization and may exert influence almost to the point of control over licensing regulations, curricula, career structures, and incomes, as well as to a large extent impose standards of practice;

- health service agencies, which represent the interests of the delivery system directly and usually feel best qualified to determine normatively the population's health needs from a technical standpoint;

- **health services consumers**, who in many countries are becoming organized into groups to represent the interests of particular segments of the general population. Historically, labour unions have to some extent played such a role.

Policy inputs need to meet certain requirements. As a minimum they should: ¹

1. constitute a systematic and orderly set of proposals that is both internally and externally consistent with the policies of other sectors;
2. be feasible in the light of the technology applicable in each country and also in financial and administrative terms;
3. possess political and social viability; and
4. guide health activities, defining future objectives and formulating an operational strategy that makes full use of the favourable factors existing and controls detrimental factors.

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Resource inputs can be divided into three broad categories: financial resources, human resources, and the infrastructure. In any planning decision, financial resources usually act as a constraint and are one of the most effective means of control exercised by policy-makers. Such control may well be negative, financial resources simply not being made available to the public health sector. The human resources input depends on such factors as the education system in general, the education system for health occupations and, most importantly, the general level of socio-economic development. This input involves three overlapping sets of people—the health workers in current supply, potential health workers (applicants, students, inactive health workers), and health services consumers. The infrastructure is composed of elements that can be either endogenous (e.g., health care agencies and training institutions) or exogenous (e.g., the economic environment, the road system, communications). The three types of resource input are interrelated, and concepts and functions incorporating them must take the interrelationships into consideration. The appropriate use of non-labour inputs is of crucial importance for the optimal use of manpower.

Each of the three basic functions of the health manpower process—planning, production, and management—in turn involves a hierarchical series of goals, objectives, strategies, activities, and targets that must be interdependent in an effective health manpower system. Table 1 summarizes these defining characteristics and the following sections, building on the concepts presented in Chapter 1, describe them in more detail.

Health manpower planning

The aim of health manpower planning is to design manpower mixes and utilization patterns in order to move the health manpower system from a given situation to a predetermined improved situation in the future. The alternatives proposed reflect the planner's interpretation of the facts and the aspirations of both the public and the health workers, and are submitted to the appropriate authorities for a decision. A health manpower plan, therefore, represents a coherent set of practical proposals intended to improve health service delivery and distribution through changes in the production, use, and motivation of health manpower.

Planning is neither self-executing nor self-fulfilling. It requires a continual effort to deal with uncertainties and contingencies and with human, financial, and technological shortcomings. Conflicting views and competing interests make it necessary for planners to exercise strong leadership and coordination if they are to discharge their responsibilities effectively and adapt promptly to changing circumstances.
<table>
<thead>
<tr>
<th>Overall aim</th>
<th>Health manpower planning</th>
<th>Health manpower production</th>
<th>Health manpower management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>To provide the framework within which the health manpower process takes place</td>
<td>To provide the manpower required</td>
<td>To optimize the use of health manpower</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>To specify the number of teams and the composition needed to improve the level of health up to a proposed level</td>
<td>To produce $x$ people of $y$ types</td>
<td>To determine manpower distribution and productivity standards, patterns of utilization, and non-labour inputs</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>Regional (subnational) planning and local programming, Health manpower project formulation, Aggregation, reconciliation, and consolidation</td>
<td>Educational planning and programming educational objectives and teaching methods</td>
<td>Reorganization, regionalization, integration of prevention and cure, country health programming, primary health care, health manpower project management</td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td>Planning and programming, Monitoring and evaluating implementation, Research and development</td>
<td>Recruitment campaigns, Definition of admission procedures and syllabus, Definition of teaching methods, Evaluation of process and products</td>
<td>Establishment and implementation of supervision system, referral system, continuing education, career development schemes, employment of manpower, staffing patterns</td>
</tr>
<tr>
<td><strong>Targets</strong></td>
<td>$x$ health teams of $y$ composition in operation by time $t$</td>
<td>$x$ trained personnel of $y$ type by time $t$</td>
<td>$x$ units of service of specified quality delivered to defined population, coverage</td>
</tr>
</tbody>
</table>
Health manpower planning has in the past been defined as being concerned only with formulating plans. This definition is too narrow, for the planner's task is not only to make plans but to ensure that they are duly implemented and that the manpower component of the health system operates efficiently and effectively. Accordingly, once the plan is operational, the planner needs to create an effective feedback mechanism so that the necessary modifications are made to the plan. To be effective, this monitoring function must be continuous, since planning is a process and not an event. To ensure implementation, the planner must act like the conductor of an orchestra. Unlike a business manager, he does not determine directly the actions of all the participating agencies, nor is he himself responsible for the production and use of manpower. His role is rather to see that all parts of the process function in harmony and are directed toward a common goal.

Manpower planning is essentially an optimizing process, in the sense that the numerous elements and resources comprising the health manpower system can be combined in a variety of ways, each specific combination having a given effect. Among the various combinations there will be one that comes closest to producing the desired effect, and it is the task of health manpower planning to identify it. The ultimate goal is to design and implement manpower plans and programmes responsive to the people's health needs and demands for services, which will ensure that the health services are adequately staffed in all geographical regions and settings (hospital, health centre, factory, school, community, etc.) and that health personnel can work effectively. This is achieved by optimizing the organizational and job design and encouraging the personnel to improve their performance by providing them with motivation, supervision, and continuing education relevant to the roles and tasks they are expected to fulfill.

In sum, the specific objectives of the health manpower planning process are:

1. to formulate health manpower plans and establish mechanisms for their implementation;
2. to influence health manpower production through the educational system;
3. to ensure continuing staff development and the most effective possible distribution and use of existing manpower resources; and
4. to establish a monitoring system for the ongoing evaluation of manpower plans.

Health manpower production

The production process is concerned with all aspects related to the basic and postbasic education and training of the health labour force.
Although it is one of the central aspects of the health manpower process, it is not under the health system's sole control. Organizationally it is often part of the education system and hence under the control of that system, although some parts may be under the direct control of the health system itself (e.g., auxiliary training and on-the-job training).

Health manpower planners have neither the competence nor the need to supervise health manpower production directly. In effect, the situation prevailing in many countries, in which manpower production is under the day-to-day control of the education system, can be seen as a form of rational subcontracting of a function to an authority of greater competence. Ideally, health manpower production should be under the control of the education system but should be given guidance by the health manpower planners to ensure that it meets the needs of the health delivery system.

Although in theory it is the education sector that controls professional health manpower production, in practice professional education is under the control of the universities, many of which enjoy a great deal of autonomy. The universities are also often under the strong influence of professional associations, which have their own vested interests. In addition to public training agencies and programmes, there are frequently private teaching institutions, each with its own policies and objectives. This fragmentation of control and this diversity of interests lead educational institutions to tend to act with little regard to the existence of health and manpower plans, thus making it doubly important that planners give special attention to the development of coordinating mechanisms. Health manpower plans in conflict with prevailing educational plans and policies are unlikely to be implemented, and educational plans dissociated from health manpower plans are likely to be irrelevant to national needs and a source of frustration to manpower trained in accordance with them.

Part of the function of the health manpower planning process is to produce health manpower production inputs that should be drawn up in consultation with educators. They include:

— policy inputs as a basis for developing and strengthening the education system
— projections of manpower requirements and qualitative occupational manpower profiles, and of their implications for educational programming, timetables, student recruitment, etc.
— evaluations of health manpower plans in relation to the process and products of education and training.

Health manpower planners should be aware of educational innovations and assess their effect on the planning process and on the implementation and evaluation of plans. Such innovations are taking place continuously even in the more traditional systems.
Health manpower management

Management covers all matters related to the employment, use, and motivation of all categories of health workers, and largely determines the productivity, and therefore the coverage, of the health services system and its capacity to retain staff. It is concerned with those entering or already working in the system and therefore doing jobs under working conditions and practices they may or may not find satisfying. The experiences of the staff will influence their attitudes towards the health system and ultimately determine how they will perform and whether the system will achieve its objectives.

Good management will reduce labour wastage in health organizations and concern itself with recruiting able people, using them effectively, motivating them, paying them adequately, and reducing the staff turnover. It will therefore, inter alia, entail (1) the formulation of manpower employment and utilization policies, (2) the monitoring of manpower requirements, (3) the geographical, institutional, and specialty allocation of manpower, (4) staff supervision and continuing education, (5) the provision of incentives and opportunities for career development, (6) performance evaluation, and (7) the provision of the necessary logistic support for efficient manpower use.

Health services delivery agencies carry out management functions while at the same time retaining an organic relationship to the health manpower process as a whole. The management, planning, and production functions are interdependent because projections of manpower requirements and occupational profiles must be based on the proposed utilization pattern which, in turn, will determine the educational objectives on which training institutions will base the formulation of their own plans.

The health manpower production and management functions, despite their dynamic relationships, are in practice quite distinct, not only in concept but also in their separate institutional identities. Different authorities are usually concerned with these two processes, and there is generally little direct coordination between them.

One of the central concerns of manpower management is the efficient functioning of staff. Personnel problems need to be tackled comprehensively through a policy of overall staff development, since this fosters the individual’s development in the organization. If the desire of individual workers for their own development can be integrated with organizational goals, the effectiveness of the whole organization will be increased, the principle of mutual responsibility being emphasized and job satisfaction being increased.

A major determinant of management effectiveness is the nature of the organizational setting within which it takes place. Since most organi-
zational settings have developed as a result of many decisions and developments over an extended period of time, those responsible for managing health manpower will usually find themselves in a situation for which the only justification is simply that it exists.

The Health Manpower Unit

The health manpower unit is the organizational base from which the health manpower process is or should be directed—planned, controlled, and influenced. The unit should contain a permanent administrative nucleus that can be expanded according to the functions to be performed. At the core of the permanent nucleus there should always be the health manpower planner, who needs a special mixture of skills.

The health manpower planner is called upon to play different roles depending on the situation in which he is operating. In planning he is the prime operator and carries full responsibility; in allied activities his role varies and his responsibility is less direct. The degree of his involvement and responsibility is not the same for all the functions he carries out. Depending on the degree, he acts as coordinator, facilitator, sponsor, negotiator, or diplomat. His sphere of activity is thus much wider than his sphere of direct responsibility, and this is reflected in the functions and roles of the manpower unit.

Functions and responsibilities

A health manpower unit is expected to assume a varying degree of responsibility for a set of functions that have a logical sequence and complement but also partially overlap each other. Among its main functions the most important are planning and programming from the initiation of the health manpower planning process itself to the final formulation of the plan, and its involvement and responsibility here are direct. Other functions flow from that of planning, involving coordinating and catalysing. Here the responsibility is less direct, but it is nevertheless vital. The health manpower unit is also responsible for monitoring and evaluating the implementation of plans. In research and development and information collection and analysis, which are inputs into planning, the planner may, but need not necessarily, have direct responsibility. At the very least he will act as sponsor and coordinator. These functions are not separate and distinct but overlap considerably. Some run concurrently and some operate at several levels—central, regional, and local.

In sum, the main functions and responsibilities of a health manpower unit, as it may be expected to operate in a national health system, are:
Planning and programming
Coordination
Catalysis of processes
Monitoring and evaluation
Research and development
Information collection and analysis.

Planning and programming. Planning and programming are the core functions of the health manpower unit and under its direct control and responsibility. Among its major activities are:

(1) the linking of health manpower planning with national health planning within the context of overall plans for socioeconomic development;

(2) the provision of assistance in the formulation of a national health manpower policy and plan consistent with national health policy and with other sectoral policies for education, employment, science and technology, and rural development;

(3) the interpretation and transmission to decision-makers of the views of consumers and of what they expect of services and of those providing them;

(4) the development of health manpower planning capabilities at the national, subnational, and local level; and

(5) the coordination of health manpower planning with the other functions of the health manpower process.

Coordination. Coordination, like catalysis, has become an important function of the health manpower unit because the institutions and agencies involved are not directly controlled by it and tend to work independently of each other and of the health manpower unit. The purpose of coordination is to distribute the several parts of the health manpower process among the agencies involved in such a way that no part of the task is neglected, there is minimal wasted effort through duplication, and implementation follows a logical and proper sequence in time. Coordination is thus a critical element in social and organizational decision-making. Collective decisions involve the consideration of information, criteria, and constraints affecting each agency and are meant to be unanimous; but the goals are multiple and competitive and change with time. Furthermore, individual aspirations may conflict with organizational goals. The basic goal of coordination, then, is to maximize the effect of the various constituent parts of the entire health manpower process.

The coordinating function has two phases:

(1) an in-gathering phase in which information, opinion, and policy from as many of the people involved in the manpower process as possible
as well as from those indirectly affected by it are brought together—this constitutes the policy information input mentioned above;

(2) an outgoing phase in the latter stages of planning, when coordination is needed to ensure that all facets of the plan are communicated, understood and implemented.

Although the health manpower unit is concerned with all the components of the health manpower process, the degree of control it can exercise over individual components varies. The less direct the responsibility, the greater the need for coordination. Indeed, the role played by the planner in this context can be visualized as a series of concentric circles, with direct responsibility greatest in the middle and becoming less and less toward the edges. In his role as coordinator the planner controls or, alternatively, cooperates, collaborates, or merely communicates with the organizations concerned.

Effective coordination may require the use of one or several methods such as the following:

(1) formal agreements between two or more institutions, such as contracts;
(2) informal arrangements about areas of competence and cooperation;
(3) joint assignments, e.g. special studies involving representatives of the agencies concerned, ad hoc committees, or task forces;
(4) rotation of staff or joint meetings involving staff of different sectors at different levels of decision-making to discuss technical and policy questions;
(5) joint participation in field missions for feasibility studies, supervision, and continuing education;
(6) a free flow of information within and between organizations (interchanges of plans, projects, and reports on progress and evaluation, etc.).

To make the coordinating function as effective as possible, it is necessary to identify in detail the areas of overlapping interests. Some of them are given below.

National health planning and health manpower planning
Problem identification
Cost/benefit analyses and the study of alternatives
Formulation of priorities, objectives, and plans
Plan implementation strategies
Policy-making
Resource allocation
Health manpower planning and health manpower production
Manpower category definition (health team composition)
Task reallocation
Manpower requirements projections
Training capacity assessments
Definition of learning objectives
Educational planning and programming
Educational technology
Educational research and development
Recruitment and student selection and admission procedures
Identification of areas in need of support
Evaluation of educational outputs

Health manpower production and health manpower management
Job descriptions and work designs
Task assignments
Supervision and continuing education
Performance evaluations
Community resources utilization for education and training
Career development patterns

Health manpower planning and health manpower management
Distribution of services and manpower
Manpower utilization and productivity
Job descriptions
Costs of services and manpower
Coverage
Identification of areas in need of support.

In practice, joint manpower studies and research projects have proved to be an effective way of identifying common goals and engendering collaboration. For example, in Colombia, the Ministry of Health and the Association of Medical Schools worked together in the planning and implementation of a national health manpower study. The national health administration thus became more involved with education and training and it now exercises a greater degree of control over such manpower production and management aspects as the training of certain categories of health workers, the estimation of requirements, and the sponsoring of special training programmes. Educators, in turn, are more involved in policy-making and planning.

In Canada, one of the techniques used to seek agreement on the major manpower issues was a series of national conferences. Among the recommendations were:

1. that planning groups should be established in all health departments as well as in national and provincial health councils;
2. that health manpower education programmes should be examined with a view to promoting their flexibility, adaptability, and coordination;
3. that nurses should take over many responsibilities of the physician in primary health care, this involving training nurse practitioners.

Coordination involving several health manpower and related organizations, some of which already have complex machinery of their own or internal coordination problems, cannot always be informal and intuitive. The more formal interorganizational relationships developed in Colombia and Canada may prove essential if real coordination is to occur.

Increasing recognition is being given to consumer participation in health services planning, implementation, and evaluation. Without questioning the right of people to participate in decisions that affect their lives, it is essential to determine in each case how far their participation is possible and practical. It requires an understanding of the power structure and the whole process of decision-making to see at what points participation can be achieved. The extent to which both consumer and provider participation is needed can be seen to depend on the degree to which a change in behaviour or practice is required for acceptance of and success in the programme.

Catalysis of processes. In the absence of direct control over the entire health system, the health manpower planner has to take positive action to ensure that predetermined changes do in fact take place. In his role as an agent for change the planner must adapt his methods to the demands of each situation. He must promote the development of common goals among the different agents concerned with the health manpower process (policy-makers, educators, health planners, administrators, providers, and consumers), and this should be possible even if their primary responsibilities, their resources, and their approaches differ.

The common concern of all agencies with, say, primary health care provides a rallying-point for the efforts of otherwise disparate groups. It must be realized, however, that interest and leadership alone will not go far in the implementation of a plan unless each agency is provided with sufficient organizational and managerial capacity to cope with that portion

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of the total plan assigned to it. Consequently, organizational development, the improvement of management potential, the development of leadership potential, and assistance in institution building are required. The aim is to promote and support developmental change, to provide continual guidance on how to increase the relevance of manpower and education plans to service needs, and to facilitate plan implementation by help in modernizing institutions, policies, and norms and patterns of organizational behaviour and relationships. In order to alter existing processes the planner must enter into new relationships and contacts. To induce change he must negotiate its acceptance—by redefining privileges and compensations, reallocating resources, and influencing and bargaining with those responsible.

The role of the planner here is seen as that of a catalyst, able to demonstrate the disadvantages of the status quo and the need to set out in new directions. Such a role is closely related to that of coordination, but it places more emphasis on supporting the individual organization and units that make up the health system in activities consistent with the plans developed by the health manpower unit.

In short, the planner must identify those areas in which material assistance is needed to enable an institution or group of institutions to contribute its share to the implementation of the plan. He must in addition play the role of management consultant in identifying gaps in organization, defining institutional policies and objectives, programming, scheduling, and budgeting, fostering institutional development, and establishing procedures accordingly. For example, he may help to develop new career structures, new job descriptions, new methods of supervision and continuing education. He may offer specialist help for reorganization or financial aid. The most important feature of his role, however, is that he should be prepared to intervene in any situation where, without the impetus that he can give, no change would take place.

Monitoring and evaluation of plan implementation. Monitoring is the carrying out of continuous or regular observation on the implementation of plans so as to detect problems at their source. Surveillance is the interpretation of monitoring data to assess the extent to which the problems call for modifications of the plan. These two complementary functions provide the means by which the implementation of health manpower plans can be controlled and evaluated. Evaluation has been defined as “that part of the decision-making process in which information about actions and their results are systematically assessed against norms and their criteria in order to select among alternatives for the future.”

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1 SCHAPER, M. Evaluation/decision-making in health planning and administration. Chapel Hill, University of North Carolina, School of Public Health, Department of Health Administration, 1973 (HAOM Monograph Series, No. 3).
Monitoring and evaluation are not just tacked on to the end of the health manpower plan as an afterthought. They need to be provided for early in planning and are the only methods by which actual performance in the plan can be assessed and constant adjustments made. They are not carried out once only but need to be continuous if the plan is to be properly implemented.

The health manpower plan has to spell out detailed objectives, specific targets, and output indicators against which achievement can be measured—including manpower production targets, staffing norms, the quantity and quality of tasks to be performed, and the health status or problem reduction goals that are to be achieved within a specified time. The monitoring and evaluation process will show whether targets are being achieved, resources are being used as planned, staff are fulfilling their performance norms, and operations are proceeding according to schedule. Early detection of departures from expected norms, outputs, and performance will lead to an investigation of the reasons why and, it is to be hoped, to corrective action.

Research and development. Improved solutions to health care problems are needed in any health system. The search for such solutions is the function of research and development, which encompasses the development, application, and evaluation of new ideas and new methods for improving the delivery of health care. Researchers and developers are above all concerned with developing and/or adapting techniques and methods to meet local needs. Research and development, as carried out by or for the health manpower unit, are not concerned with biomedical research.

In this chapter the term research and development is taken to mean health services research, which is broadly defined as the systematic investigation and evaluation of the development and functioning of health services in their association with health-related factors. Health services research is predominantly evaluative in terms of feasibility, need, coverage, availability, utilization, costs, outcomes, etc.; it is thus the rational foundation for planning policies and for the implementation of new health-related programmes, though measurement of some of the factors concerned (especially those entailing judgements of questions such as acceptability and social equity) may involve the study of community decision-making itself.

The WHO Advisory Committee on Medical Research has said that the general failure to recognize the value of health services research is of particular significance in developing countries, where the favoured alternative may often be a normative or authoritarian approach to health services planning. This failure is partly a matter of history, cost, acceptability of delivery, isolation of research workers, and limited resources for research; it is also political, in that policy-makers and planners do not like
their weaknesses exposed. But decisions made without a valid and reliable
data basis and unsupported by health services research based on knowledge
of epidemiological and behavioural science are likely to be wrong and to
lead to inappropriate utilization of resources or to an unwise investment
in corrective health education efforts.

Research and development are neither spontaneous nor continuous
activities; they take place only if commissioned. They may be based
on problems highlighted in the course of information-gathering or planned
monitoring and are likely to be problem-oriented. They may be applied
to such fields as services organization, manpower resource allocation,
and management and manpower training.

It is unlikely that the health manpower unit will itself carry out all
the research and development needed. It is more likely to sponsor all
or part of it and engage specialists for the actual work, perhaps on a con-
tract research basis, while retaining the overall responsibility.

Information management. The need for accurate and timely information
gives rise to a very distinct subordinate activity in planning—information
gathering and analysis. Manpower planning cannot function without
such an information base. Data or information based on data are essential
at every stage—from the formulation of alternative strategies to the moni-
toring of the implementation of the plan.

Communication of the information is also essential because the free
and full exchange of relevant information is essential for effective coor-
dination. From this point of view information is the raw material for
cooperation in the same way as monitoring or intelligence is the raw
material for surveillance.

Where responsibility for information retrieval should be placed is
a serious problem: should the planning unit have complete control over
it or should it be with a more specialized statistical unit? The manpower
unit may occasionally assume full responsibility for the functions of a
statistical unit as they relate to manpower, including field work and data
processing, analysis, and publication. Usually it commissions a statis-
tical unit to carry out the work, but it must in any case collaborate closely
with that unit in defining the manpower component of the national health
information system.

If the health manpower unit assumes full responsibility for the design
of the information system, it must also spell out the norms and procedures
for data collection at the various levels of the health system and generally
play a supervisory role. It should, for example, ensure that the necessary
staff to carry out this function is available.

The current trend is towards decentralizing statistical work. In fact,
this particular work should be considered as part of the total health infor-
mation system and therefore coordinated accordingly. The information to be collected, the methods of data collection, the analysis, and the timing will be determined by the requirements of those responsible for the formulation, implementation, and evaluation of health manpower plans. This requires close coordination between statisticians and planners from the very beginning. The planner must, for example, be informed of what information is or is not available, while the statistician needs to know how the data will be used in order to plan a suitable information base for the planner.

There are certain advantages in the administrative decentralization of information gathering and retrieval. It allows authorities at the intermediate level to assume responsibility for operations in their area of jurisdiction, especially in a regionalized scheme. In such cases they should keep the central level well informed about the course of the operations. The responsibility at the local level is basically that of coordinating the different activities related to data gathering according to predetermined norms through training and service agencies.

Special care should be taken to avoid duplication of the information collection and retrieval already taking place in other agencies or in connexion with other planning processes. The health manpower unit should keep an inventory of all the information sources available.

Despite the acknowledged achievements of health statistics, it is generally agreed that the functions of planners and statisticians are too seldom linked. The planner frequently has to depend on unsuitable or inadequate information in formulating his plans. Even more frequently the statistician is asked to provide information that is not available or to devise evaluation schemes after plans have been initiated or implemented. Too often the planner fails to detail the goals and objectives to be achieved or the statistician fails to ask the questions that would result in clear statements of such goals and objectives.

Desirable characteristics of the health manpower unit

There is little published information describing the size, characteristics, location, and functions of health manpower units, and the available information tends to be of little value for making comparisons or determining the relative effectiveness of alternative patterns. Accordingly, the suggestions that follow are intended to provide general guidance; planners will need to take into account local factors that may make one or another of them not entirely appropriate to the situation.

It is essential that all those concerned with the health manpower unit regard it as a source of constructive aid in an area of critical and difficult coordination and decision-making. They should be prepared to recognize
its sphere of influence and authority. This is more likely to be achieved if the unit can foster and maintain a spirit of cooperative problem-solving in which its particular contribution is to provide information and analyses on the past and present and forecasts of the future and to facilitate coordination and collaboration between the agencies concerned. In this way the health manpower unit will be seen as a new and powerful force for improving the health delivery system. It may find itself operating in areas seen as the traditional preserve of others, and this may be a potential source of conflict. Such areas are health manpower statistics, job evaluation and work study, educational planning, and manpower management, in any or all of which its operations may not agree with popular expectations of the purpose of a health manpower unit. To avoid jurisdictional conflicts, a clear delimitation of the degree of involvement and responsibility of the unit in each sphere of activity must be developed.

There can be no firm rules for determining the optimum size of the health manpower unit. Much will depend on the degree of sophistication of the health system, the extent to which responsibility is centralized or decentralized, the coverage and size of the health manpower pool, and the scope of the process the unit controls directly. The size of the permanent unit need not be large, particularly if it is possible to borrow staff from other areas for specific assignments.

There are certain skills the health manpower unit must either possess or be able to call upon. It needs a full-time health manpower planner of suitable experience and seniority or, as a minimum, a health planner with experience in manpower planning and allied roles. Other areas in which skills need to be available include educational planning, economics, statistics, political science, public administration, personnel administration, labour relations, social science research, and law, and the necessary logistic and secretarial support is required. The multidisciplinary core team should organize task forces with special responsibilities in, for example, education, implementation, and evaluation. Not all the staff need to be full-time, though if the staff devote less than 50% of their time to the unit it may affect their motivation.

Health manpower planners must in general not only be technically competent but also able to make planning acceptable and flexible. They should use simple and straightforward terminology, since resistance to planning has been stimulated by seemingly arrogant attitudes or by the unnecessary use of technical jargon that obscures more than it clarifies. Planners should remember that success depends above all on the cooperation of many persons and institutions and that their support is therefore essential.

Although such a manpower unit will usually function at the national level, much of what has been said about a national unit applies also at
subnational levels. It is one of the functions of the central unit to assist lower-level units to cope with their health manpower problems.

A health manpower unit may be a separate unit within either the health or the education sector, part of a general health planning unit, or an inter-agency or interministerial steering committee with a strong secretariat. There is no location for such a unit clearly to be preferred; any type of arrangement would be satisfactory if manpower planners have:

1. close liaison with the top health service policy-makers;
2. freedom to cooperate with other relevant units (statistics, epidemiology, personnel, management, etc.);
3. freedom to communicate with those involved in health manpower planning at lower echelons of the health system and with training and service agencies;
4. close contact with new health care developments;
5. extramural advice from national sources; and
6. political, administrative, and financial support.

A health manpower board (or council) with coordinating and advisory functions has proved useful in a number of countries. Such a board would have broad responsibility for supervising the health manpower process and should concentrate its attention on important policy issues and decisions. It should represent the key groups concerned with health manpower questions and, if possible, include political personalities and representatives of the public. The health manpower unit, whatever its administrative location, could act as the secretariat for the board; or the board could have its own secretariat.

Even though there is no universal pattern for organizing health manpower planning, enough planning systems exist to warrant mention. They are:

1. A national body overseeing the development and coordination of social and economic plans—usually a board consisting of high government officials that formulates general policies, including manpower policy.
2. A national socioeconomic planning secretariat with a general manpower division (or human resources division) whose full-time technical staff reports to the board.
3. A manpower subcommittee of the board, composed of senior officials of main government departments in the health and other sectors, which makes recommendations to the board.
4. Working groups reporting to the subcommittee and dealing with data collection and analysis, intersectoral and interinstitutional coordination, manpower projections, and the like.
(5) A separate health manpower planning unit, a health planning unit of the ministry of health, a planning unit in the ministry of education, or a joint working party including representatives of the ministry of health, other areas of the national health administration, or health teaching institutions, with responsibility for health manpower planning. Some countries have created special commissions or manpower institutes or task forces attached to the health planning unit of the ministry of health or, alternatively, set up as a separate unit with greater autonomy.

The Panamerican Health Planning Conference¹ recommended the establishing of health manpower units in ministries of health. They should be the result of a political decision to solve health manpower problems and be staffed by personnel trained in planning and possessing an adequate knowledge of educational matters as well as of the political and socioeconomic factors that affect human resources.

Both Colombia and Venezuela institutionalized the health manpower process by creating a bureau in the ministries of health that was responsible for health manpower planning and for selected aspects of the education and training of some categories of health workers. In Colombia the bureau was subsequently upgraded to the level of directorate and its scope, authority, and resources were expanded to improve its powers of control and coordination, both within and between organizations.

In 1972 the Canadian federal and provincial governments agreed to establish a Federal/Provincial Health Manpower Committee. Its objective is to improve and maintain the supply, quality, distribution, and productivity of all health manpower in Canada at a level that makes possible the delivery of effective and efficient health care. This committee forms the nucleus of a countrywide organization that, it is hoped, will have the necessary competence and authority to secure agreement on national issues and problem-solving methods. At the federal level, the Health Manpower Directorate of the Department of National Health and Welfare is the Secretariat of the Committee and maintains liaison with national professional associations through various subcommittees. The organization (Fig. 4) involves the many agencies at the provincial and national levels concerned with health manpower development programmes.

Integrated development of health services and manpower

A central problem in preparing and implementing manpower plans has been the lack of coordination among the various groups concerned

with health manpower planning, production, and management. Each of the groups has tended to go its own way, communicating too little and too late with other relevant groups and responding only to pressures within its own group. This division is most conspicuous between providers (health training institutions) and consumers (health service agencies) of health manpower. Health manpower units alone have not succeeded in effecting the necessary coordination.

To overcome this long-standing obstacle to planned change, WHO is promoting the integration of health services and health manpower.
The purpose of such integrated health services and manpower development (HSMD) is to improve health services through better coordination of health manpower planning, production, and management.

The HSMD concept is perhaps best defined as the integration of the different functional elements of the health services and health manpower systems into a unified, comprehensive, acceptable system providing health care directly relevant to the health needs of the population, so that the health services would be run by appropriate teams of health workers, all trained within the unified system.

Integration in a country could be expected to lead to:

(a) coordination between the health and other developmental sectors;
(b) coordination, both intersectoral and intrasectoral, between the health care delivery system and the health manpower system;
(c) coordination between the components of the health care delivery system—planning, delivery, management, and research;
(d) coordination between the components of the health manpower system—planning, production, and management.

The HSMD concept puts the main emphasis on national needs for health care and is directed towards developing a series of integrated actions to meet those needs by the constituent parts of the health system. This it does by associating all the agencies concerned with health services and health manpower through some formal institutional mechanism. In this way health service planners and health manpower planners, producers, and consumers at all levels are brought together on a permanent basis to discuss, plan, formulate, and implement policies and programmes of common concern. Fig. 5 presents schematically the functions, participants, and interrelationships concerned.

The HSMD environment is essentially political; a wide variety of forces, constraints, and confrontations between organizations that have historically pursued their own objectives are involved. To make the institutional mechanism work will require the full commitment of the leaders in all the sectors, and reconciliation of the diverse vested interests, points of view, and managerial approaches will depend on the creation of mutual trust and reliance and on the ability of those responsible to stimulate other groups rather than on sanctions or the use of power. This will require a network of contacts based on an appreciation of the problems, the resources available, and the organizational and political structure. The technical must also be linked with the political in order to win the commitment and involvement of the leaders.

The linkages so created between individuals and groups are intended to create better patterns of relationships, better channels of communication
and influence, new power centres, and new configurations for decision-making, planning, and management, and for this purpose it may be necessary to create a body with higher powers able to elicit cooperation, resolve conflict, and prevent competition. The act of working together should help participants to appreciate each other’s problems, to learn from each other and, in the process, to become more prepared to make concessions to each other.

Changes of this kind will facilitate coordination between institutions as well as improve managerial practice by (1) creating an environment
more conducive to collective decision-making; (2) bringing about agree-
ment on the changes needed; and (3) furthering the redeployment of author-
ity and the reallocation of resources.

The degree to which leaders of the various organizations are willing
to share power with the coordinating body will determine the success
the HSMD mechanism has in going beyond the simple exchange of informa-
tion to involvement in planning and policy formulation and implemen-
tation.

The HSMD mechanism should be concerned with a wide range of
activities as part of its coordinating role. Among the more important
of these are:

- The promotion of collaboration among all the agencies and insti-
tutions involved in health manpower development.
- Technical cooperation in areas related to manpower training and
  utilization.
- Help in the development of a health manpower information system.
- The promotion of research and development.
- Assistance in institution-building to strengthen the planning and
  management capabilities of participating organizations.

The notion of a coordinating mechanism to bring health manpower
producers and consumers together is neither new nor revolutionary, and
indeed a number of countries already have something resembling such a
mechanism. Unfortunately, in many cases it is only marginally functional
and has little impact on policy. The HSMD approach seeks to formalize
and legitimize the coordinating function so that the many diverse agencies
and institutions related to health manpower production and utilization
can work closely together for the fulfillment of common goals. As such,
it is a simple and effective way of accelerating the extension and improve-
ment of health care services.

SUMMARY

Expanded coverage is the most important single health service goal for the next
decade in most countries, developing and developed alike. The successful attain-
ment of this objective will require careful resource planning and management. The past
record in this regard has not been good and, however inadequate the planning may
have been in many countries, the implementation has tended to be even worse.

This chapter deals with the organizational and managerial aspects of health man-
power planning and outlines the scope, functions, and organization of the health man-
power process, which is viewed as all the functions performed by the various components
of the health manpower system and has a horizontal as well as a vertical dimension. It
stresses the dependence of health manpower planning on overall health planning and
the indivisibility of the health manpower process itself—a process that must be conceived
and looked upon as an integrated whole. Health manpower planning provides the
foundation for educational plans, and educators should look at the health services to ascertain the extent to which the education they provide meets the requirements of the health delivery system.

Horizontally, the health manpower process involves the efforts of a number of agencies and organizations, both within and outside the formal health system. Vertically, it involves activities at all levels in the health manpower system, from national policy-making bodies to local health care delivery units and practitioners.

The importance of the health manpower process derives from the fact that the health services are highly labour-intensive and that virtually all members of the health manpower supply of a country are affected in one way or another by decisions taken in the context of the health manpower process. Poor planning, incomplete planning, or total lack of planning will lead to an inadequate manpower supply, inappropriate manpower production, and inefficient manpower utilization. Good but uncoordinated planning may have the same results. For this reason emphasis is placed on the need to improve communication so as to facilitate the coordination of health services and educational institutions, even when such institutions are outside the traditional boundaries of the health sector. Although difficult to implement, this is needed if national health manpower systems are to benefit to the full from the expertise, resources, and political backing existing in their countries.

The chapter concludes with a description of the mechanism that WHO is promoting for the integrated development of health services and manpower. This mechanism integrates health manpower planning, production, and management within a coherent system responsive to national needs as they are reflected in health service requirements.
Demand
Thomas L. Hall 1

One of the most important and difficult aspects of health manpower planning is the estimation of demand. Without a clear understanding of the variables that influence the demand for health care and of the ways they may change with time, even sophisticated analyses of manpower characteristics, distribution, productivity, and costs can contribute relatively little to policy formulation. However, since the widely divergent analytical techniques for the analysis of demand may give equally widely divergent results, it is hardly surprising that many planners pay limited attention to this part of their work. This chapter, which seeks to help redress the balance, is practical in its aim, has no special reference to any health manpower category, and is primarily directed towards the needs of planners in the developing world, though it is also relevant to the more industrially advanced countries.

The concepts of demand, need, and requirements

The word demand, though usually considered to be the opposite of supply, has tended to confront health planners with numerous semantic and operational difficulties. It is therefore useful to clarify it and related terms in anticipation of the sections that follow.

According to the market economist, demand is a measure of the quantities of goods or services that buyers take at alternative prices. 2 Such factors as income, preferences, and the relative prices of other goods are taken as constant. 3 As applied to the health sector, a demand curve would show how the use of a given health worker’s services varies with the price of such services; for each price level there is a different utilization level or effective demand. This approach can be applied, with some modifications, irrespective of who or what bears the cost of the services obtained—patients, government, or insurance.

1 Professor of Health Administration, School of Public Health, University of North Carolina, Chapel Hill, NC, USA.
2 The price charged for a commodity or service, including a health service, may or may not approximate to the cost of its production. What is important here is the price to the consumer, not the cost to the producer. See Chapter 11 for a fuller discussion of the economist’s concept of demand.
The concept of demand as a curve of points relating alternative prices to the consumption of goods and services is in sharp contrast to the one used frequently by those working in the health sector. The humanistic ethic has often caused planners to regard health services as of such positive value that they should be made available to all citizens regardless of their social or economic situation. As a result much health planning has been based on professionally determined estimates of the presumed need for health services—a concept that then tends to become regarded as an expression of the demand for such services.

As will be evident later, neither the approach based on pure demand nor that based on professionally determined needs has provided a completely satisfactory basis on which to plan health services. Each approach neglects an important part of the reality within which a planner must operate; for the former the high social value ascribed to health results in societal interventions that distort the usual market forces acting on supply and demand, and for the latter the massive resource, administrative, and other constraints existing in many countries make it unrealistic to plan health services based on the full potential of current medical technology.

In recognition of the semantic confusion that sometimes arises through use of the word demand, planners may find it convenient to use the more neutral word requirements, which does not carry with it implications about the underlying approach and assumptions used in their determination. The definitions in conventional use for the terms demand, need, and requirements are given below and the interested reader is referred elsewhere 1 for more detailed discussions of these concepts.

Demand, used in a more restrictive or technical sense, refers to the sum of the amounts of the various types of health services that the population of a given area will seek and has the means to purchase at the prevailing prices within a given time period. From this demand the health manpower required to produce these services can be derived. Demand may also be used more generally as a synonym for requirements, as in much of this chapter.

Need represents an estimation based on professional judgement and current medical technology of the number of workers or amount of services necessary to provide an optimum standard of health care. Need exceeds demand when there are insufficient resources to produce or purchase services in accordance with professionally determined needs.

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Requirements refers to the amount of services, manpower, etc. required to satisfy a given set of assumptions about how the health sector does, could, or should function. These assumptions may or may not be made explicit and may be premised in any one of a number of different approaches to planning.

Factors affecting demand

A wide variety of factors can influence the demand for health manpower, only some of which are subject to a measure of control within the health sector. Listed below are eight categories of factors likely to be of great concern to the planner. Though all are important, their relative weights in planning will vary according to the methodological approach chosen, the nature of the health system, and the manpower category being considered—topics that are discussed in later sections. It should also be noted that each affects both the quantitative and the qualitative aspect of demand. For example, the planner will probably use quantitatively and qualitatively different staffing standards for otherwise similar populations living in urban or in rural areas or having an older or a younger age structure. The categories are:

(1) Demographic. These factors include the size, distribution, density, growth rate, age structure, and sex ratio of the population. Population size and distribution are usually the most important.

(2) Economic. At any given price a strong positive correlation usually exists between disposable income and the demand for health care. Since price is a mediating variable, if the demand exceeds the supply the price will increase and vice versa until a new equilibrium is established. In the absence of a price variable, as in a government-financed health care system, the waiting time for services and other such variables will tend to replace the price as the mediator between supply and demand.

(3) Social and cultural. Two important and often overlapping variables are educational attainment and the level of health consciousness, or the degree to which the public is aware of the availability of health care and places a high valuation on obtaining it. If health consciousness is low the effective demand for care is also apt to be low and not well matched to the main health needs of the population.

(4) Health status. One would logically expect to find health status varying inversely with demand, so that as the health status improves the demand declines, and vice versa. Although this tends to be so at any given socioeconomic level of the population, it may not be very evident

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1 Disposable income refers to what remains of personal income after taxes and other mandatory deductions have been paid.
in the population as a whole because of the high correlation between socio-economic status and demand. Accordingly, in many countries, by reason of the limited availability or poor accessibility of health care to those with a low income and/or a low educational attainment, the demand for health services may be low among precisely those most in need of them.

(5) **Accessibility.** Accessibility is a function of all the many factors that serve to facilitate or restrict health care use, which include travel time to and waiting time at the health facility, the convenience of the time of appointment, the availability of appointments, the cost, eligibility for care, social and cultural barriers to receiving service, and impersonal or discourteous treatment.

(6) **Resource availability.** The supply of resources may go a long way towards explaining the demand made on them. If hospital beds and personnel are available in abundance, even to the point of “excess”, the utilization rates will, all other factors being equal, be higher than would otherwise be the case.

(7) **Resource productivity.** Following on the above, and assuming a given availability of manpower, hospital beds, etc., if resource productivity is increased the output of services will be greater and a higher level of demand can be satisfied.

(8) **Health care technology.** The level of health care technology attained in a country will have a direct effect on the services that can be offered, and hence upon the manpower required to produce them. Moreover, the mere availability of new techniques may often result in a desire to introduce them, irrespective of their potential contribution towards improving health.

**Estimating Demand**

The existence of several different methods of doing something usually means that no one method has proved its superiority over the others, and this is certainly true in the case of estimating demand. The planner’s problem is more one of selecting wisely from among a variety of existing methods—and of trying to interpret properly the results obtained—than of developing additional techniques. As planners have accumulated experience in manpower planning, several lessons have emerged that are especially useful as they relate to the assessment of demand.

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1. A good example of the increasing documentation on the effect of supply on demand is the study by Foxx, W. R. & Kaestner, M. J. “Determinants of expenditures for physicians’ services in the United States 1966–1968,” Washington, Department of Health, Education, and Welfare, National Center for Health Services Research and Development, 1972, DHEW Publication No. (HEW) 73-3013 (DHEW, HSMC5A), in which the supply of physicians was one of the variables that had the highest significance in predicting demand, presumably owing to the physician’s ability to control the demand.
First and foremost, the conclusions derived from a manpower assessment will in large part be determined by the specific planning methods adopted. Different methods are based on different views of how the health sector operates and of the forces that control its development. Even where there is considerable agreement on the underlying forces, the results of projections derived by different techniques can lead to very different policy recommendations.

As a consequence, it can be concluded that there is no "best" method or combination of methods for estimating demand that is applicable to all situations. Moreover, few planning efforts are of such finite scope that one method alone will suffice. More usually, a combination of methods will be needed, each method being applied to that portion of the plan for which it is best suited. And, as will be discussed more fully later on, it is often useful to make a rough test of the feasibility of meeting a postulated manpower target by comparing the desired rate of change with that observed in the recent past.

Just as a combination of methods may prove most useful in the assessment of demand, so too it will probably be preferable to study the demand for health personnel working as teams rather than for individual manpower categories such as doctors or nurses. In practice, health personnel almost always work in teams and the productivity of one category affects and is affected by the productivity of others. In estimating the demand for one category apart from the demand for others with which it interacts substantially there is a risk that important variables bearing on demand will be neglected. To minimize this risk it will usually prove advantageous to include in the planning team persons drawn from the various health professions under consideration.  

Finally, the planner should not minimize the strong interaction between the supply of and demand for health services and, consequently, for health manpower. Optimally, the anticipated demand for health care, however calculated, should be the primary determinant of manpower supply policies and not the reverse, though not infrequently the latter seems to be the case. Health officials must therefore guard against the possible adverse effects that decisions about the supply, taken because of short-term considerations, may have on shaping the future requirements for health manpower.

This chapter is concerned with the selection, application, and evaluation of the principal methods for estimating demand. The first part provides a summary description of the principal methods now in use, and is fol-

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1 An important proviso is that the planning team should truly function as a team, and not as a collection of representatives of disciplines (nursing, medicine, dentistry, etc.), each with sole responsibility for planning in his or her area of expertise.

2 For example, the creation of a new manpower category to compensate for a temporary shortage of personnel, or the construction of a hospital network more for political than for health reasons, may have a profound and lasting influence on shaping future manpower requirements.
lowed by a more detailed description of each method and a discussion of its application, merits, and limitations. The chapter concludes with sections on the development of manpower standards, criteria for the selection of an approach to estimating demand, ways of testing the feasibility of attaining one or another postulated manpower target, and taking into account the unpredictable.

Methods of estimating demand

Four methods of estimating the demand for health manpower are described below, these being termed for brevity the health needs, service targets, health manpower (or economic), and manpower/population ratio methods. The main differences between them can be readily appreciated from the schematic presentation given in Fig. 6. Two differentiating characteristics are especially noteworthy.

(1) The first three methods convert people according to various assumptions into the health services they require, which are then converted into the manpower required to produce the services. The fourth method converts people directly into manpower.

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\[1\] As yet there is no widely adopted terminology or conceptual framework for the various methods in use for estimating demand, and indeed for some it would probably be sufficient to refer only to the need, demand, and manpower/population ratio method. However, for quite a number of countries it is felt that the service target method as here described has sufficiently distinctive characteristics, orientation, and utility to justify its being listed as a separate category.
The health needs method is normative in orientation, the health demands method is predictive, the service targets method as usually applied tends to be normative, and the ratio method lends itself to either approach. These distinctions are important when it comes to selecting a method for a given planning situation; normative methods are appropriate when health authorities can and intend to take an active role in shaping future sectoral developments, while predictive methods are more suited for anticipating future developments without necessarily seeking to modify them significantly.

The four methods are presented as distinct entities, though in fact each has a number of variants that overlap considerably with other methods.1 Accordingly, planners should not give undue importance to the specific label applied to one or another method but instead examine the underlying assumptions each makes about how the health system does or should operate.

Health needs. This method seeks to determine what health services people actually require to keep them healthy. The determinations are made by health professionals, with or without the involvement of the consuming public, and are based primarily on medical and technological considerations. Other issues, such as cost, the capacity to deliver the services needed, and the degree to which people are apt to seek the services, may be important but are of secondary concern. Health needs as determined by experts should be distinguished from health wants, which reflect the services desired by the public whether or not health professionals consider them to be necessary.

Service targets. In this method the primary focus is on setting targets for the production and delivery of health services. The targets are established by the health authorities and may be based on a wide variety of inputs including health needs, economic demands, consumer wants, and manpower ratios. This method usually presupposes a health system that takes an active role in shaping sectoral developments: it seeks to disaggregate for analytical purposes the various component parts of the system; and it seeks a good balance between what the population needs, what it wants, what medical technology can offer, and what society can actually deliver at a given point in time.

Health (or economic) demand. This method asks what numbers and kinds of health services people will actually use at the anticipated monetary and other cost of obtaining these services. Current health service util-

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1 For an excellent survey of the many different planning models that have been used see especially Vector Research, Inc.: An analysis of health manpower models, Washington, Department of Health, Education, and Welfare, HSE (DHHEW Publication No. HRA) 33-19, Vol. 1; An inventory of health manpower models (DHHEW Publication No. HRA) 53-19, Vol. 2.
ization rates are a good measure of the met demand (also termed the satisfied demand or effective demand) for health services, and the planner may also want to take into account the unmet demand for services, given certain assumptions about their cost and accessibility. For this method the professionally determined need for and the quality of the services to be demanded are of secondary importance.

**Manpower/population ratio.** This method uses an observed or desired manpower/population ratio as the basis for deriving manpower requirements. Such a ratio can either be used as the primary technique for estimating requirements as shown in Fig. 6, or be a by-product of calculations carried out in relation to one of the other methods. In relation to the latter, if it is found, for example, that 1000 health workers of a given type are required to meet the health needs of a population of one million, then the derived manpower/population ratio—based on the health needs approach—is one per 1000.

**The health needs method**

The health needs method is appealing both to the planner and to the health worker. For the former it is logical, and rooted in the attractive though at times questionable assumption that the provision of health care rests on a strong scientific basis; for the latter it is consistent with the prevailing social ethic that all should be provided with health services according to their needs and without reference to social or economic criteria that have no bearing on their needs. These same attractive characteristics, however, may induce planners to apply the method inappropriately or ignore the substantial problems implicit in its use.

To use the health needs approach to estimate demand the planner will need:

1. to determine the disease-specific mortality and morbidity rates of a region or country;
2. to prepare norms governing the number, kind, frequency, and quality of services to be provided to persons suffering from each disease category;
3. to prepare staffing norms so as to convert the various services (e.g. initial visits to doctors, follow-up visits to doctors, home visits, laboratory tests) into the amount of time required of the doctor, nurse, technician, auxiliary, etc., to perform the services;
4. to calculate the total personnel hours needed in the target year for the projected population, based on the disease-specific morbidity rates, the services required per sick person, and the amount of personnel time required to perform each service;
(5) to divide the total personnel hours needed by the average number of hours worked annually per person to determine the total supply of health manpower required.

The manpower requirements for public health or preventive programmes such as maternal and child health, cancer or tuberculosis detection, and environmental health can also be estimated using an analogous approach. Moreover, the analytical process can be considerably simplified by working with disease groups (e.g. cardiovascular diseases or cancer) rather than with specific disease entities.

A classic example of this approach to estimating manpower requirements is the study prepared for the United States Commission on the Costs of Medical Care in 1933. The study, which was based on available estimates of morbidity and professional judgements as to what constitutes good medical practice, concluded that 135 physicians per 100,000 population were necessary to provide "adequate medical care."

For many years this approach was seldom used except by the USSR and a few other socialist countries. In the USSR, for example, standards for optimum care are based on detailed studies of population samples deemed to be receiving adequate care, and these are often used to project manpower and facility requirements. In the 1960s, in parallel with the growing interest in health planning and the tremendous expansion of data collection and processing capabilities, a number of other countries in both the developed and developing worlds alike began to give more attention to planning based on the health needs method. In the United States, Schönfeld and associates used this approach to estimate that, by American standards of health care, approximately 133 physicians were required to meet the primary care needs of 100,000 population. In Latin America, the Center for Development Studies (CENDES) of the Central University of Venezuela in Caracas, in collaboration with the Pan American Health Organization (PAHO), developed an approach to planning that sought to optimize the allocation of resources, including manpower, according to the relative impact each different activity had on reducing mortality and morbidity. The preparation of manpower and other standards for the provision and production of services to combat each disease category is an integral part of the CENDES/PAHO planning method.

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1 Lee, R. I. & Jones, L. W. *The fundamentals of good medical care: an outline of the fundamentals of good medical care and an estimate of the service required to supply the medical needs of the United States.* Chicago, University of Chicago Press, 1933.

2 Ministry of Health of the USSR. *The system of public health services in the USSR.* Moscow, 1967.


4 CENDES (Center for Development Studies), Central University, Venezuela. *Health planning: problems of concept and method.* Washington, Pan American Health Organization, 1965 (Scientific Publications, No. 111). Health plans based on the CENDES/PAHO method, including estimated manpower requirements, have been prepared in a number of Latin American countries including Chile, El Salvador, Peru and Venezuela, to name a few.
recently, the Sri Lanka National Health Manpower Study based a substantial part of its comprehensive health plan on a careful assessment of the manpower requirements for coping with the major disease conditions.\(^1\)

At this point it is important to recall the difference between health needs as determined by experts and health wants, the services desired by the consuming public. By virtue of their training, health professionals consider themselves the best qualified to determine what kind of care people need to become as healthy as existing medical knowledge permits. They are often reluctant to acknowledge that an individual's assessment of his own need for care may vary considerably from the professional's assessment—a variance that is the consequence of the individual's own particular blend of social, cultural, economic, educational, psychological, and other characteristics contributing to his valuation of health care.\(^2\)

Because of this the planner should make due allowance in his normative determinations of need for the subjective attitude of consumers of health care.

The merits of the health needs approach are often more than offset by the various problems encountered in its application, particularly in developing countries. Among them are: morbidity and other data requirements beyond the capabilities of the health statistical system; a wide gap between the need for health care and the ability to satisfy it; insufficient sectoral control to ensure that, when the resources are adequate, providers will indeed produce the needed services and consumers use them;\(^3\) the inherent difficulty of developing optimum standards for the management of many disease conditions and of evaluating them in terms of their health outcome; and the likelihood that the approach will give little attention to the assessing of alternatives, particularly those not based on the view that health care delivery is a matter for physicians.

Various attempts have been made to overcome these and other problems. The CENDES/PAHO method uses the health needs approach only in relation to disease or service categories considered to have a favourable cost-benefit ratio, while other categories (e.g. cancer, private sector services) less amenable to prevention, cure, or public sector intervention are accommodated under different planning criteria. Most plans based on health needs give at least some recognition to the difficulty of satisfying them all within the foreseeable future. In countries where the planning resources are unable to cope with the methodological problems and/or the health

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3. This may lead to the curious phenomenon evident in a number of industrially advanced countries and even in some developing countries, that the resources allocated to certain health services may exceed what is actually needed or utilized. This may arise because of provider-induced demand for unnecessary services (e.g. elective surgery, excessive follow-up visits) or because of low consumer demand for certain services perceived to be of little value (e.g. immunisations, prenatal care).
care system can provide only a fraction of the services needed, the health needs approach in its pure form is likely to be of marginal value and may even divert attention from more important issues affecting the allocation and use of resources.

To list the methodological and practical difficulties inherent in the health needs approach is not to minimize its potential utility in health manpower planning and in the design of educational programmes. Its importance will increase in proportion with the health sector’s ability to measure health needs and to respond to them. These conditions are already in large part fulfilled in a number of specific health programmes, particularly preventive programmes, in which both the health problems and the health services needed are comparatively easy to delineate. Good examples include those for mothers and children, the detection and control of tuberculosis, and dental care for children. As long as the planner keeps the limitations of the approach clearly in mind and does not go beyond the relevant data available or the health system’s ability to provide the necessary services, the method can be very useful.

The service targets method

The service targets method is gaining increased acceptance in the estimation of manpower requirements. As the name implies, it involves the setting of targets for the production and delivery of specified health services, and then the conversion of those targets into manpower requirements by means of staffing and productivity standards.

It is important to distinguish between the essential features of this approach and those of the others, since each may involve the use of targets and standards at one time or another. The target-setting approach may be characterized as microanalytical in that it considers separately each of the various component activities of the health sector rather than treating them globally, as variants of the ratio or demand methods may do. Other distinguishing features are that its primary focus is on the provision of services, not of manpower, and that it is conducive to an active health policy concerned with shaping future events rather than just anticipating them.

The service targets method has a number of important advantages and some limitations. Among the advantages are: the easy disaggregation of health services, which in turn facilitates the matching of each component part of the health system with the most appropriate method for estimating

\[ \text{For example, physician requirements for a prenatal care programme could be based on the needs method, for curative services on the demands method, for educational programmes on a target method (increasing the faculty/student ratio from 1:7 to 1:6), and for rural health services on a ratio method (one health centre with a physician and auxiliary staff per 5000 population).}\]
demand; the attention drawn to the importance of productivity and its improvement; the simplification of cost estimates; and an active approach towards improving the health services.

The major constraints are generic to any method that allows the planner discretion in departing from extrapolations of past experience. He may make major errors of judgement about the ability of the sector to expand its productive capacity at the desired rate, the administrative capacity to deliver and distribute the specified mix of services according to plan, and the public’s willingness to use the services produced. The method has limited utility where the government lacks control over the health services delivery system.

The health demands method

Much experimenting has taken place in recent years with a wide variety of techniques for estimating the future demand for health services on the basis of demand functions that seek to correlate the amount of care sought with such variables as income, costs, access, education, age, sex, and residence. For the most part these functions are based on the concept of effective demand, the actual utilization of health services, and hence exclude needs or wants not backed up by the means to fulfil them. They also tend to be based on the presumption that correlations observed in the past or in the base year will remain constant over time, though this does not preclude the planner from building into his projections postulated changes in the correlations. While many different variables have been considered in demand functions, economic ones usually receive the most attention, many people being led to refer to economic demand as the term covering this class of techniques. Based as they are on detailed analyses of the past and present correlates of demand, these techniques are apt to require sophisticated data inputs and are more predictive than normative. As a result they have the greatest applicability in countries with abundant statistical data in which the government plays a relatively passive role in relation to health sector development and hence is more concerned with anticipating than shaping the future.

Despite the obstacles to the widespread use of at least some variants of the health demands method, this approach to planning offers several important advantages. First, no other method of estimating demand can provide the planner with such a comprehensive view of the dynamics of health services utilization, e.g. the factors that promote or retard utilization, the interactions between demand and supply, and the extent to which some population subgroups are receiving more or less services than

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1 One would like to use the expression "determinants of demand", but since it is often not clear how population variables such as age and sex affect demand the more neutral word correlates is used.
their presumed health status would justify. Even when this information is not used as the primary basis on which to project demand, it can help the planner anticipate future developments and correct obvious anomalies.

The second important advantage has to do with the method's apparent realism or—a perhaps more appropriate term—conservatism. Since most planning based on this method assumes constancy in the demand correlates over time (an assumption that has proved conservative in most countries), the risk of setting excessively expensive or otherwise unrealistic objectives is avoided.¹

It should be emphasized here that most variants of the demands approach to planning can be used to good advantage in socialist as well as in market economy health care systems. Irrespective of how health services are financed and delivered, demand forces act upon producers and consumers alike to determine how resources are allocated and services utilized. These forces can be measured and their probable effects over time estimated. Even if most socialist economies and many developing countries choose to base their manpower demand estimations primarily on normative rather than on predictive methods of planning, techniques within the latter category can make an important contribution to deepening the planner's understanding of the dynamics of manpower demand.

The remainder of this section describes the main variants of the health demands method and mentions briefly some of the newer techniques under development.

Constant utilization rates for a changing population. This variant of the health demands method uses as a point of departure the health services utilization rates observed for various population subgroups classified according to variables found to be correlated with demand. The population in each subgroup is then projected to the target year and multiplied by the corresponding base year utilization rates for medical, dental, hospital, and other services to derive the likely demands for these services that the subgroup will make in the future. The projected demands for all the subgroups are then aggregated and the total demand for services is then converted into the manpower required to produce them by means of staffing and productivity standards.²

The simplified example given in Table 2 shows how incomes rising over time can increase the average per capita demand for services even

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¹ By way of further explanation, assume that a population of defined characteristics makes on the average one dental visit in a given year. In projecting the demand this population will make in a future year, two assumptions are probably valid: (1) that the future demand will almost certainly not be less than one visit, and (2) that there is a good chance that the demand will exceed one visit owing to an increasing improvement in the supply of dentists (i.e., supply effects on demand) and an increase in the public's valuation of dental care.

² Demand predictions can also be based on the per capita health care expenditures observed in each population subgroup, rather than the per capita demand for services. Projected expenditures for each population subgroup and for each type of health service are then divided by the estimated expenditures per physician, dentist, etc. to derive the likely demand for manpower.
### Table 2. Example of Demand Projection Based on Constant Utilization Rates by a Changing Population (Hypothetical Data)

<table>
<thead>
<tr>
<th>Population Income Category</th>
<th>Population In Income Category (millions)</th>
<th>Per Capita Utilization of Doctor Visits (Average Values)</th>
<th>Number of Doctor Visits (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income</td>
<td>10</td>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>High income</td>
<td>4</td>
<td>2.0</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>1.3</td>
<td>18</td>
</tr>
<tr>
<td>Target year (projected values)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low income</td>
<td>9</td>
<td>1.0</td>
<td>9</td>
</tr>
<tr>
<td>High income</td>
<td>9</td>
<td>2.0</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>1.5</td>
<td>27</td>
</tr>
</tbody>
</table>

* The definitions of low and high income used in the base and target years are the same.

though income-specific utilization rates remain constant. According to the hypothetical but not unrealistic values given in the table, the projected rise in income would cause the average per capita utilization of visits to doctors to increase from around 1.3 in the base year to 1.5 in the target year.

This method has been used effectively in both developing and industrially advanced countries. In China (Province of Taiwan)\(^1\) a sample survey of 66,000 persons provided the necessary data base from which utilization rates were calculated for 288 different population subgroups, while in Chile\(^2\) the corresponding values were 45,000 and 648. Twenty-year projections in these two countries, taking into account the anticipated changes in income, educational levels, residence, age, structure, and the like, suggested that the per capita demand for private sector visits to physicians would increase by about 19% in each country.

In the United States manpower demand projections have been developed\(^3\) based on utilization data obtained from an ongoing national health survey. In each case the projected service demands were then divided by the number of services each health manpower category could or did produce annually to obtain the projected health manpower demand.

Of all the variants of the health demands method this one offers the planner the most complete picture of the dynamics of health services

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utilization, information that has many uses besides serving as a basis for projecting demand. On the negative side, this variant, along with the others within this category, provides the planner with a static view of the distribution of health resources. An example drawn from the Peru health manpower study illustrates both the problem this method presents to planners and a possible solution. According to findings in that study the urban-rural gradient in the annual utilization of doctor visits ranged from 4.2 per capita for Lima residents to 0.3 per capita for the 50% of the population living in the highlands, a 14-fold difference between the two extremes. According to the assumptions of a planning model based on constant utilization rates for a changing population, the only way rural residents will improve their utilization rates is by leaving the rural areas for the towns and cities. If government health policies are passive, the assumption that rural residents will continue their low utilization rates provides a realistic basis for planning. However, if the government plans to increase the rural health services, as it did in Peru, it would be necessary to base projected manpower requirements for rural areas on one of the normative methods.

Population and income. This variant is simpler than the preceding one in that the demand for services is based on only the two factors—population and income—that seem to be the best correlates of the utilization of health services in predominantly private sector health economies. Population projections are normally made for an entire region or country, though it may occasionally be necessary to exclude persons eligible for comprehensive health programmes in which personal income is not important. To use this method the planner must first determine the income elasticity of health expenditure, a value then used to convert the projected rise in disposable income into the amount likely to be spent on health services and, by means of traditional conversion factors, into probable manpower requirements.

In India, the Institute of Applied Manpower Research used variations of this technique to project the likely demand for doctors in the public and private sectors during the fourth and fifth five-year plans. For both sectors regression techniques were used on available historical data to develop coefficients which, in the case of the public sector, could convert public expenditure into demand for government doctors and, in the case of the private sector, could convert national income estimates into the demand for doctors in private practice. These coefficients were then

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2 Income elasticity is the percentage change in the consumption of health services relative to the percentage change in the income potentially available to spend on health services or, alternatively, in the price of health services. An income elasticity of 0.5 would mean that, for a 10% rise in income, expenditure on health services would rise by 5%. This concept is discussed further in Chapter 11.
applied to estimates of the trend of national expenditures and income to derive the probable demand for doctors.

Many developing countries would find it difficult to apply this method, despite its apparent simplicity. The main difficulty is the lack of reliable data on income and on the relationships between income and health expenditure. The biggest hurdle is that of estimating income elasticity. For example, even in the United States, where income and health expenditure data are relatively abundant, elasticity estimates for expenditure on physicians' services range from a low of 0.2 to a high of 0.7. This situation is apt to be further complicated in developing countries owing to such factors as the presence of a large public sector and a very steep income gradient in which the poor are much closer to subsistence living than in developed countries. This latter factor argues in favour of using different elasticity values for different income levels rather than a single value for the entire country.

Other methods. Three other methods in this general category should be mentioned, even though they are of more restricted utility than those described above. For the most part they should be used only to determine the degree to which the demand for manpower in a given category is in balance with the supply, and not as a basis for estimating requirements.

(1) Rate of return. The manpower planner, in common with other planners, seeks to invest his scarce resources where they are likely to produce the highest return. One way of approaching this task is to compare the costs of training different manpower categories—including both direct costs and income foregone during the training period—with each category's subsequent lifetime earnings discounted to their present value. Comparison of the ratios so derived from the different occupation groups can indicate where a given investment in training can produce the largest economic return. The more favourable the derived ratio, the more probable it is that the manpower category is in short supply and that, at least for the near future, investment in training that category will produce the largest economic return. While such information can help guide investment in training, the planner must keep in mind its limitations. These include its unsuitability for estimating numerical manpower requirements, the

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1 Klarman, H. E. Economic aspects of projecting requirements for health manpower. In: Methods of estimating health manpower: report of a symposium. WHO Copenhagen, Regional Office for Europe, 1967. Much of the discussion in this and adjacent sections on economic approaches to estimating manpower requirements is based on this work.

2 A given sum of money at a future point in time is not "worth" as much to individuals as the same amount of money at the present time. Accordingly, future earnings must be discounted to the present in order to compare realistically comparisons that social diffusing lengthy of training and of active employment. The simple formula is: 

3 In certain situations it may be useful to distinguish between the private and the social rate of return, which may lead to quite different conclusions regarding priorities for public expenditure. The private rate takes into account only personal expenditure for training and net earnings after tax, while the social rate is based on gross earnings before tax and includes public sector training expenditure.
degree to which one or another discount rate can influence the final results, and the failure of the method to take into account non-pecuniary advantages (e.g. prestige, autonomy, and responsibility) of potential importance in the decision to select one or another profession.

(2) Relative earnings. An approach occasionally used by economists to assess actual or potential manpower shortages is to compare the rate of increase in the average earnings in the occupation under consideration with that of other occupations. If it is found, for example, that dentists’ earnings have increased only half as fast as professional salaries taken as a whole, it can be inferred that there is a relative surplus of dentists. The applicability of this technique is limited in many countries owing to a lack of reliable information on earnings, particularly in the private sector; in the case of public sector health workers, too, salary levels may be influenced as much by political factors as by the usual market forces of supply and demand.

(3) Job market. Employer surveys to obtain information on budgeted job vacancies, personnel turnover, the average time for which vacancies remain unfilled, the anticipated and desired number of new positions in the coming year, and the like have frequently been used to estimate short-term manpower requirements. While information about the job market is often of considerable value in identifying actual or incipient shortages or surpluses, it must be interpreted with care. Common problems include: budgeted vacancies that offer non-competitive salaries (e.g. nursing posts in church-operated hospitals); budgeted posts deliberately kept vacant to allow administrators to reserve enough funds to meet end-of-year deficits caused by inflation, delayed fiscal allocations from a central authority, unexpected contingencies, etc.; and the inability of many administrators either to predict their budgetary growth or to anticipate their staffing needs over more than a short period of time. If these and other technical problems are taken adequately into account, job market information can help planners assess the strength of demand and, in the case of personnel requiring limited training, provide a sufficient basis for calculating short-term manpower requirements.

Manpower/population ratios

For most countries the manpower/population ratio has been the method of choice both for estimating the demand for health manpower and for characterizing the supply. Its main virtues are simplicity, low

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1 The turnover rate has been expressed in a number of ways. According to the preferred definition it is the number of persons employed in a given manpower category per year divided by the maximum number of filled positions for the same category during the year. Accordingly, if a hospital with 60 budgeted nurse auxiliary positions had a peak nurse auxiliary staff of 50 during a given year and a total of 60 different nurse auxiliaries who were employed during the year, the turnover rate would be 1.6 (50 divided by 30). The turnover rate is an expression of personnel stability on the job.
cost, and ease of interpretation by those concerned with manpower policies. The method has only two essential data inputs: population projections and the desired manpower/population ratio. Once these have been developed, the ratio is used to calculate the corresponding manpower requirements. Some ways in which manpower/population ratios are commonly derived are described in the next section.

For most applications the method suffers from three serious drawbacks. First, it has little value as an explanation of how the health sector works; it does not for the most part consider questions about how demand and supply forces interact, what factors tend to increase or depress demand, and to what extent a given ratio contributes to health or to the satisfaction of perceived health wants. Second, since the method converts "population" directly into "manpower" without the intervening step of services produced, little consideration is usually given to exploring ways of increasing manpower productivity through changes in the interpersonnel ratios (e.g. doctor/nurse) or in manpower functions and organization. Finally, the planner runs a relatively high risk of selecting an inappropriate or unrealistic ratio, with predictable consequences for policy.

Some of the problems inherent in this method, especially as they relate to developing countries, are well illustrated by the findings of Bennett and his colleagues in their study of health manpower for East Africa (Kenya, Uganda, and the then Tanganyika). In 1964 they estimated the doctor/population ratio to be 1:18 500, though on closer examination of the components of this ratio they found that, while there was approximately one doctor per 4000 urban residents, the ratio for rural areas—where more than 90% of the population lived—was roughly 1:31 000. The authors further pointed out that population density is a key variable in evaluating the adequacy of a doctor/population standard, so that a ratio of 1:10 000 might be reasonably adequate for Africa in areas where the population density is high but very inadequate where it is low, as in many developing countries of the world.

**Standard-setting**

All four of the above methods for the estimation of demand require standards for calculating manpower requirements. These standards may be derived experimentally or empirically from past or current experience, or they may be based on professional judgement or international

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1 For example, one doctor per 1000 population rather than 4000 visits and 130 hospitalizations per 1000 population, services that require 0.7 and 0.1 full-time equivalent doctors, respectively, supplemented by 0.1 full-time equivalent doctors for all other activities, for a combined total of one doctor per 1000 population.

experience. This section describes the main methods of standard-setting in use and their advantages, limitations, and applications.

Maintaining the status quo. If the current manpower situation is generally satisfactory and the health services delivery system is not apt to undergo rapid change, standards based on the maintenance of current manpower/population ratios, staffing patterns, and the like are clearly justifiable. This method, at least as it applies to the formulation of manpower/population standards, is not often used.

Experience and professional judgement. Information about past and current patterns of manpower and health services use and about manpower productivity provides an excellent basis on which to develop standards and targets. In some countries trend lines have been developed showing how manpower/population ratios, productivity, and other indices of manpower use have changed over time. These trend lines are then extrapolated into the future as a basis for estimating manpower requirements. For example, in Canada it was found that the doctor/population ratio improved by more than 1% annually during the decade preceding 1961. One of the alternative projections considered by Canadian manpower planners postulated the continuation of this annual rate of improvement until 1991.

Comprehensive prepaid health programmes for defined populations may provide a useful basis on which to develop manpower staffing standards or ratios. In a number of studies in the United States, for example, the manpower/population and manpower/facility ratios observed in large multispecialty group practices are used to estimate the manpower required to provide the United States as a whole with comparable standards of care. The findings of such studies, helpful as they are in suggesting major inconsistencies in the way manpower is used and the possible requirements for a defined level of care, may provide limited guidance for national planning because of the many hazardous assumptions on which the extrapolations are based.

A method of estimation of demand based on the extrapolation of past trends that is useful in countries with a relatively passive attitude towards the distribution of health care and rapid urbanization is described below. This method is predicated on the basis of the widespread finding that most categories of professional health workers establish themselves preferentially in urban areas and hence, as a country becomes more urban,

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<table>
<thead>
<tr>
<th>Population category</th>
<th>Base year (observed)</th>
<th>Target year (assumed to be 10 years later)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population (millions)</td>
<td>Population per doctor</td>
</tr>
<tr>
<td>Urban</td>
<td>2</td>
<td>2 000</td>
</tr>
<tr>
<td>Rural</td>
<td>8</td>
<td>10 000</td>
</tr>
<tr>
<td>Both</td>
<td>10</td>
<td>5 505</td>
</tr>
<tr>
<td>% Increase</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

the manpower/population ratios for these categories will improve nationwide. Table 3 provides a simplified but not unrealistic example of how this approach could be used to project physician requirements over a ten-year period. The hypothetical figures given in the example yield a national annual population growth rate of 3.4% and an urban growth rate of 7.2%. Even assuming no change in the urban and rural manpower/population ratios, physician requirements would increase 67% over 10 years as compared with a population increase of 40%. Although one is reluctant to postulate that rural residents would continue to have only one physician per 10,000 population, the postulate would probably not be unrealistic unless there were strong government policies favouring the location of physicians in rural areas. In the absence of more sophisticated projection techniques and of vigorous government policies favouring planned change, this method of deriving target manpower/population ratios has much to recommend it.

In many developing countries past experience may prove insufficient to provide much guidance for the future, and planners may have to rely primarily on their best judgement of what is desirable and feasible, as was done in planning studies carried out in Malawi, Nigeria, and Tanzania. In all three countries empirical targets were developed by the national health authorities for the number, distribution, and characteristics of health facilities in relation to different segments of the population. For each type of facility staffing standards were developed and the manpower requirements calculated by multiplying the number of facilities of each type by the personnel required.

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1 See, for example, Nigeria, Federal Ministry of Health, National Health Planning. Introduction to the development of basic health services in Nigeria. Lagos, 1972; and Greer, O. Medical auxiliaries in Tanzania. Lancet, 2:1325 (1973).
Situation observed in the most favoured region. Manpower plans have often derived their target ratios or standards from those found in the most favoured region or part of the country. Thus, if a country has an overall physician/population ratio of 1:5000 and a most favoured regional ratio of 1:3000, then the ten-year target for the country as a whole becomes 1:3000. As long as manpower distribution and performance are uneven, this method will always yield a current insufficiency. Moreover, in the case of a target manpower/population ratio there is little assurance that, as the ratio improves towards the desired standard, the additional personnel will establish itself in those areas of the country found to be short of manpower in the base year. Indeed, in a number of countries it has been observed that, although the overall manpower/population ratio has improved with time, the gap between the most and the least favoured regions has in fact widened.

International comparisons and standards. Many manpower plans include a section that compares the manpower/population ratio and perhaps indices of manpower performance found in the country under consideration with similar indices reported by other countries at various levels of development. A single or composite standard is then selected from among the other countries, based either on the presumed adequacy of the situation found elsewhere or on the assumption that during the interval between the base and the target year the country under consideration will attain a level of development comparable with that now observed in the other country or countries. In other cases planners adopt standards proposed by international agencies such as WHO or by countries with an extensive planning literature.

Although this method of standard-setting is easy, it carries with it the substantial risk that the standards adopted from other countries will have little applicability to the country under consideration. In choosing standards and targets by this method the planner must first ensure that reasonable congruence exists between his and the other country in all the major variables that influence the demand for manpower.

Despite the difficulty of finding other countries sufficiently comparable with their own, international comparisons can help planners keep projections realistic by providing them with values for the limits within which their own country's manpower situation is likely to evolve. It is particularly useful for planners to review the experiences of countries at a comparable level of development that have either very high or very low manpower/population ratios or other indices of manpower productivity and utilization. By seeking to determine why certain countries have apparently better or worse indices than others at a comparable level of development, and by examining points of similarity and dissimilarity between his own and other countries, the planner can improve his understanding of what
his country is likely to accomplish over time and of the main prerequisites to success. In making such comparisons the planner should make due allowance for the problems of data comparability and for the great variations in manpower utilization in different countries, factors that will complicate the interpretation of the data.

Task analysis and functional analysis. These are techniques developed in recent years to facilitate the elaboration of staffing standards and, in the process, to improve productivity. The two techniques overlap in some aspects but they also have important differences. Aspects of both techniques are still in the developmental phase and they have not yet been used for comprehensive health manpower planning on a national scale. The planner should keep abreast of further developments in this field, since these techniques will become increasingly important tools for improving the quality of manpower planning and utilization. Chapter 5 provides further information on this topic.

Task analysis and functional analysis share as a common objective the identification of the behavioural skills, resources, and organizational contexts that are essential to the efficient and effective performance of specified tasks and functions. The word task implies the carrying out of a specific action by a health worker—e.g. taking a patient’s clinical history, performing an examination, or explaining to the patient his condition and the recommended therapy—which forms part of a larger complex of actions in a specified category of health care. The word function is sometimes used as a synonym for task, though in functional analysis it assumes a broader meaning and refers to a variety of interdependent tasks that constitute an entire segment of a health programme. For example, functional analysis may cover preventive services provided to well persons, curative services provided to sick persons with non-emergency illnesses, and emergency services.

The starting-point of the analysis is the breakdown of various health activities into their constituent tasks and functions. These are the smallest units of analysis relevant to the problem under consideration. For example, in analysing tasks performed by nurse auxiliaries in a family planning programme, it is preferable to consider the task of taking the blood pressure as an integral unit rather than attempt to subdivide it further into placing the blood pressure cuff on the patient’s arm, attaching the cuff, etc. Minimally acceptable performance standards are then developed for each task or, if feasible, each function, and these standards later serve as the basis for estimating resource requirements. As regards manpower, these requirements take into account not only the number and type of personnel needed but also the specific skills, knowledge, and attitudes required of the personnel.
Selecting a planning method

As should be evident by now, the decision on which planning method or methods to use will depend very much on how the planner assesses the situation in his own country. Chapter 1 referred briefly to the kinds of questions the planner needs to answer and the most important ones as they relate to demand analysis are summarized below.

(1) Does a genuine political commitment exist to provide certain minimum standards of health care for all citizens, i.e., universal coverage for basic public health and primary care services plus some referral services? Will the government be primarily concerned with anticipating the demand for health manpower likely to emerge from a dominant private sector, or will it seek actively to shape and extend health services in accord with total community needs? Is the existing health care delivery system for the most part adequate to meet national needs or does a big gap remain between what does and what should exist? If the government's attitude is essentially passive, the planning methods should be primarily concerned with predicting or forecasting trends, while if it is active planning methods should be selected that facilitate the testing of the programme and cost implications of alternative manpower policies. By virtue of their professional orientation most planners will be predisposed toward an active approach. However, when this is not realistic, planners should preferably use predictive rather than normative planning methods while concurrently preparing the way for later adoption of a more active approach towards those aspects of the health sector most in need of change. Even in situations where a normative method is clearly called for, planners can usefully complement their normative projections with information obtained by predictive techniques—information that can deepen understanding of the correlates of demand and suggest the likely course of events in the absence of planned change.

(2) Do or will the legislative, administrative, fiscal, and other means exist to enable the government to implement policies calling for substantial changes in the production, utilization, and distribution of health manpower? This is an obvious corollary to the first question, for without means for implementing change a commitment to do so will have little effect. Here, too, planners tend to be over-optimistic about what can be accomplished, an optimism that can result in the adopting of inappropriate methodologies and of unrealistic planning targets.

(3) Can the country make proper use of the data requirements and planning expertise called for by the demand method or methods adopted?

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Footnote: This need not imply that the government has a minor role in health manpower policy; quite the contrary. The government, frequently in concert with the private education and service sectors, may have a major role in deciding how many health workers, of what kinds, and with what kind of training, will be prepared, and in taking action to ensure manpower preparation and deployment according to the anticipated requirements.
Does the demand method allow for as much disaggregation of the component manpower demands as is usable by planners and policy makers? Disaggregation can greatly help planners to understand the dynamics of manpower supply and demand as well as facilitate planned development, but excessive disaggregation risks creating either a false impression of precision or unusable detail. Moreover, planners should maintain a proper balance between the accuracy of data and the level of detail sought for each of the interrelated components of the planning effort.

(4) Lastly, do the manpower projections call for a rate of change markedly greater than that achieved in the recent past? If so, the planner should make sure that political, social, economic, and administrative developments are likely to make such accelerated change feasible.

Once the planner has candidly assessed the national situation within which he must operate, he can proceed to select one or several methods for estimating demand. Table 4 summarizes the advantages and disadvantages of and the indications for each of the four methods discussed in this chapter. Wherever possible the planner will find it advantageous to adopt the simplest method consistent with the level of data disaggregation required and use such a combination of methods that the end result provides a more comprehensive view of the manpower situation than could be obtained from one method alone. The next section provides an example of a combined approach in a developing country. The Chile and Sri Lanka health manpower studies already cited provide more detailed examples of the combined approach.

The combined approach to estimating demand: the Colombian example

Colombia has been developing a plan for the provision of services to nine million persons (36% of the total population) with little or no access to health care. The method adopted to estimate the manpower requirements makes use of all the four planning techniques described in this chapter but relies primarily on the two normative approaches—health needs and service targets. The plan is built around a regionalized scheme of health services that extends from the most peripheral unit—the health promoter who serves widely dispersed rural residents—up through a variety of facilities to the most specialized ones available only in the larger cities. In deciding on the number and kinds of persons to serve at each level and the mix of services to be provided, planners made use of detailed morbidity surveys carried out earlier, the accumulated experience of pilot simplified medicine programmes, statistics on service utilization, referral rates, and international experience. Certain priority services for pregnant women, preschool children, nutrition, communicable disease control, and the provision of safe water and waste disposal facilities were planned
on the basis of normative techniques, while relatively modest and empirical resource allocations were made for the provision of curative medical services. The cost implications of the entire scheme were then worked out and set against the likely availability of resources. The concept of a “module of annual coverage” (MAC) was developed to facilitate estimating the resources (including manpower) needed to provide basic health services to approximately 6000 population—this being equivalent to the jurisdiction of six health promoters. The elements of the regionalized system are shown below:

**Health promoter**
- Serves approximately 1000 persons living within a two-hour travel radius
- Has primary education plus two or three months of specialized training in public health and simplified medicine
- Is selected for training by the community
- Is supervised by a nursing auxiliary living within six hours’ travel radius
- Meets 40% of the demand for care and refers 60% to higher levels

**Nursing auxiliary**
- Supervises six health promoters
- Meets 10% of the demand for care and refers 90% to higher levels

**Health post**
- Staffed by a full-time physician and a small supporting staff
- Supervises the work of the nursing auxiliaries in the area and, through them, of the health promoters
- Meets 30% of the demand for care and refers 70% to higher levels

**Health centre/community hospital**
- Staffed by physicians and other health professionals
- Supervises work of health posts within its jurisdiction
- Meets 15% of the demand for care and refers 85% to higher levels

**Specialized hospitals and other facilities**
- Meets remaining 5% of the demand for care.

**Feasibility testing: uses and limitations of past experience**

All manpower planners, irrespective of whether their plans are based on a continuation of the same rate and same direction of change as were observed in past years or on a radical departure from past experience, can benefit greatly from a review of what was actually accomplished during the past decade or so. Past experience is probably the best single indicator of the degree to which a country can tolerate, sustain, and implement
<table>
<thead>
<tr>
<th>Potential advantages</th>
<th>Potential disadvantages</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health needs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appealing and comprehensible logic</td>
<td>Complicated, costly, and requires extensive and detailed data</td>
<td>Especially applicable to countries with:</td>
</tr>
<tr>
<td>Consistent with ethic of providing services based on need and not social or economic conditions</td>
<td>May encourage excessively detailed planning</td>
<td>Sophisticated data systems, survey capabilities, and planning expertise</td>
</tr>
<tr>
<td>Facilitates study of productivity, utilization, staffing ratios, etc., since the emphasis is on the production of services and not of manpower</td>
<td>Standard-setting frequently complicated by lack of consensus on optimum care and on health effects of care</td>
<td>Relatively adequate health services delivery system</td>
</tr>
<tr>
<td>Encourages evaluation of health technology</td>
<td>Likely to result in projected service requirements well in excess of country’s ability to provide them in excess of consumer willingness to use them</td>
<td>Ad hoc government policy towards delivery of services</td>
</tr>
<tr>
<td>Encourages allocation of resources where they will have the greatest effect</td>
<td>Tends to be based on physician model for health services delivery</td>
<td>Dominant public sector with relatively strong control over manpower and delivery of services</td>
</tr>
<tr>
<td>Promotes concern about quality of care</td>
<td></td>
<td>Relatively high level of public awareness and knowledge about health matters</td>
</tr>
<tr>
<td>Facilitates cost estimation</td>
<td></td>
<td>Particularly applicable to preventative, public health, and specific health programmes (tuberculosis, etc.) based on well established technology, reflecting national interest.</td>
</tr>
<tr>
<td>Facilitates health team planning</td>
<td></td>
<td>Countries lacking the statistical expertise noted above</td>
</tr>
<tr>
<td>Service targets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitates disaggregation of components of demand with most suitable method being used for each one</td>
<td>Standard-setting should be more on desire than reality</td>
<td>Especially applicable to countries with:</td>
</tr>
<tr>
<td>Facilitates study of productivity, utilization, staffing ratios, etc., since the emphasis is on the production of services and not of manpower</td>
<td>May encourage excessively detailed planning</td>
<td>Dominant public sector with relatively strong control over manpower and the delivery of services</td>
</tr>
<tr>
<td>Usually easy to interpret the planning rationale to others</td>
<td>Especially for components of demand not subject to much control</td>
<td>Ad hoc government policy towards delivery of services</td>
</tr>
<tr>
<td>Facilitates cost estimation</td>
<td></td>
<td>Although useful for both preventive and curative services, more used for the former</td>
</tr>
<tr>
<td>Readily usable with other planning methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitates health team planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitates demand model revision as new information becomes available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires only modest data and planning capabilities, though amenable to more sophisticated techniques</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Health demands

- Facilitates understanding of the dynamics and determinants of demand
- Allows disaggregation of the various components of demand
- Tends to produce economically realistic projections
- Probably results in a good estimate of the minimum growth in demand likely to occur and ensures that the level of future satisfaction at least equals that of the present
- Some variants of this approach are quite simple
- May provide useful information for comparing the economic returns from training in health occupations with those in other fields
- Some variants require sophisticated data and can be very complicated and costly to carry out
- May neglect political and societal reasons for improving health services distribution and delivery
- Does not necessarily take into account the quality of services or their relevance to the health problems of the country
- Some methods neglect consideration of ways to improve manpower productivity
- May be difficult to interpret rationale and results to health authorities and the public
- May perpetuate inequalities in the access to care

Manpower/population ratios

- Easy to use and interpret to others
- Data requirements usually modest and data relatively insensitive to errors within the validity of the underlying assumptions
- If current health situation is reasonably satisfactory, maintenance of the status quo is a defensible policy
- Useful for providing baseline projections of the different kinds of manpower required to maintain the current situation
- When ratio is end-result of application of another, more precise, method, can be useful short cut for short-range and intermediate-range planning
- Easy to select unrealistic ratios
- Generally used with single occupational categories, thus discouraging examination of the adequacy of the manpower mix
- Relatively-difficult to estimate costs
- Some methods of selecting target ratios will inevitably show a manpower shortage
- Provides little insight into the dynamics and determinants of demand
- With the primary emphasis on manpower, planners may neglect the potential for improving productivity, distribution, utilization, relevance of services, etc.

Especially applicable to countries with:
Dominant private sector (or for private sector planning)
Passive government attitude towards delivery of services
Relatively minor imbalances in the provision of services to different segments of the population

Especially applicable to countries with:
Reasonably adequate health conditions and health delivery systems
A relatively stable health sector
Limited planning resources
Either an active or a passive approach towards the delivery of services
Either public or private sector dominance
Reasonably comparable international models to pattern their health care system on
change and of the problems likely to arise in introducing change. Planners should be especially concerned with establishing: (1) whether the demand projections call for a faster or slower expansion of the manpower supply than has been achieved in the past; (2) whether implementation of the plan is likely to engender significant political and/or interprofessional conflicts, and (3) what main departures from past trends are called for by the demand projections, with what implications for policy and cost.

Various indices of national growth and development relevant to the expansion of the health labour force are listed below. In most cases trend lines of acceptable accuracy can be developed with data from no more than three or four different years over the past 10–15 years. The derived average annual growth rates for the last five or more years, supplemented by available projections of future changes, can be compared with the past and projected average annual growth rates in the manpower employed. Useful indices include:

1. the rate of increase in the gross and per capita national products;
2. the rate of increase in public expenditure;
3. the rate of increase in health expenditure in the public and, if possible, in the private sector; and
4. the rate of increase in the total labour force; the “services” component of the labour force and, if possible, the health sector labour force.

The number of health workers employed in different reference years may, without further adjustment, provide a very misleading basis for estimating the historical rate of growth in the health labour force. For example, trend lines constructed with gross supply figures could mask differential growth rates in the public and private sectors or in the different levels of health personnel. If the planner believes that the public and private sectors have evolved differently during the period under consideration, he should develop separate manpower supply trend lines for each one.

Another factor requiring careful attention is cost projection, particularly when the health manpower mix is undergoing rapid change. In many countries a major objective of manpower policy is to improve the balance between the several levels of health personnel. Obviously, the sustainable rate at which lower cost personnel categories can be increased is far higher than is possible for the higher cost categories. Chapter 11 discusses manpower economics in greater detail, but here it may be noted that the use of simple adjustment factors can greatly improve the utility of comparisons between past performance and future projections. Table 5

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1 More specifically, what is likely to be the attitude of political authorities, the public, and the professions towards the introduction of a new manpower category or the rapid expansion of an existing one? Almost inevitably any significant change is likely to be opposed by one or more groups who perceive their situation to be adversely affected, and in assessing the feasibility of a plan the planner will need to take this opposition into account.
TABLE 5. HYPOTHETICAL EXAMPLE OF HOW TO ESTIMATE PAST AND PROJECTED AVERAGE ANNUAL RATES OF INCREASE IN HEALTH MANPOWER COSTS

<table>
<thead>
<tr>
<th>Estimated number of personnel</th>
<th>Physicians, dentists and pharmacists (high level)</th>
<th>Nurses and other allied health professionals (middle level)</th>
<th>Auxiliary and other supporting personnel (supporting level)</th>
<th>All health manpower categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>8,000</td>
<td>4,000</td>
<td>14,000</td>
<td>26,000</td>
</tr>
<tr>
<td>1970</td>
<td>10,240</td>
<td>4,880</td>
<td>18,240</td>
<td>31,360</td>
</tr>
<tr>
<td>1975</td>
<td>11,107</td>
<td>5,953</td>
<td>18,934</td>
<td>37,094</td>
</tr>
<tr>
<td>1985 by policy emphasizing *</td>
<td>Supporting level: 16,367</td>
<td>16,354</td>
<td>54,106</td>
<td>66,036</td>
</tr>
<tr>
<td></td>
<td>Middle level: 20,054</td>
<td>20,054</td>
<td>28,655</td>
<td>69,769</td>
</tr>
<tr>
<td></td>
<td>Middle and high levels: 20,341</td>
<td>19,854</td>
<td>22,652</td>
<td>59,859</td>
</tr>
<tr>
<td>Relative income scales ++</td>
<td>6.0</td>
<td>2.0</td>
<td>1.0</td>
<td>---</td>
</tr>
<tr>
<td>Relative expenditures (1000s)</td>
<td></td>
<td></td>
<td></td>
<td>106.3</td>
</tr>
<tr>
<td>1965</td>
<td>48.0</td>
<td>8.0</td>
<td>14.0</td>
<td>80.0</td>
</tr>
<tr>
<td>1970</td>
<td>51.4</td>
<td>9.8</td>
<td>15.8</td>
<td>77.4</td>
</tr>
<tr>
<td>1975</td>
<td>78.6</td>
<td>11.9</td>
<td>18.8</td>
<td>106.3</td>
</tr>
<tr>
<td>1995 by policy emphasizing *</td>
<td>Supporting level: 110.4</td>
<td>33.0</td>
<td>34.7</td>
<td>178.1</td>
</tr>
<tr>
<td></td>
<td>Middle level: 102.1</td>
<td>41.3</td>
<td>29.8</td>
<td>178.1</td>
</tr>
<tr>
<td></td>
<td>Middle and high levels: 122.1</td>
<td>33.6</td>
<td>22.3</td>
<td>178.1</td>
</tr>
<tr>
<td>Average annual % increase in manpower</td>
<td></td>
<td></td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>1965-75</td>
<td>5.1</td>
<td>4.1</td>
<td>3.0</td>
<td>3.8</td>
</tr>
<tr>
<td>1975-80 by policy emphasizing *</td>
<td>Supporting level: 3.4</td>
<td>10.8</td>
<td>8.3</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td>Middle level: 3.2</td>
<td>15.2</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Middle and high levels: 4.5</td>
<td>10.9</td>
<td>1.8</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Note: These values given for 1965-75 are typical of a developing country with a relatively well established health infrastructure. There are more high-level than allied health professionals and, although somewhat more of this latter category may graduate each year, postgraduate attrition in the female profession is typically higher, leading to a relatively lower growth rate. The manpower pyramid, therefore, takes the form of an hourglass, with a substantial number of high-level health workers supported by a smaller number of allied health professionals and a larger number of poorly trained auxiliary health personnel. The three postulated 1975-85 options seek to correct this situation by different ways.

* These projections assume a 5% average annual increase in total expenditures on health manpower, the increments being used to increase the numbers of high, middle, and supporting personnel in the ratios specified, i.e., 1/2, 1/3, and 7/8. In the case of the first set of ratios this would mean that two middle-level and three supporting-level personnel would be added for each one in the high-level category. The third option sets that some of the annual expenditure increase will in fact be allocated to increasing real incomes is not taken into account, a factor that would lower the actual rate of manpower increase.

++ Assumes that high-level health manpower have on average six times the gross income of supporting-level personnel and that middle-level personnel have twice the income of those in the supporting level.

* Obtained by multiplying the number of health workers in each category by the corresponding relative income scale (6.0, 3.0, and 1.0).

shows such adjustment in a hypothetical situation and a related technique, based on Chilean experience, is described in Chapter 11. The manpower supply is divided into three (or occasionally four) levels, based on similarity of approximate gross income, and relative income values are assigned to each level. In the example given, auxiliary personnel are assigned an
income of 1.0, nurses and similar allied health professionals an income of 2.0 (i.e., their average gross income is twice that of auxiliaries), and doctoral level personnel an income of 6.0—a relative income scale not unlike that found in many countries. For the purpose of these calculations the relative income scale does not have to be very precise.

The number of additional health workers at each level that can be absorbed by the sector, assuming a 5% average annual real increase in expenditure on health manpower, varies greatly according to the postulated mix of new entrants into the health labour force, as is shown below:

<table>
<thead>
<tr>
<th>Personnel level emphasised in each policy alternative</th>
<th>Projected 1985 interpersonnel ratios (high/middle/supporting)</th>
<th>% Increase in manpower supply, 1975-1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting</td>
<td>1.0: 0.9: 1.9</td>
<td>84</td>
</tr>
<tr>
<td>Middle</td>
<td>1.0: 1.2: 1.6</td>
<td>78</td>
</tr>
<tr>
<td>Middle and high</td>
<td>1.0: 0.8: 1.1</td>
<td>57</td>
</tr>
</tbody>
</table>

Although the manpower mix and expenditure assumptions can be modified to suit local conditions, no country can escape the fact that each new health professional will cost much more than each new auxiliary; hence the importance of taking this into account when the feasibility and other implications of the projected manpower requirements are subjected to an initial review.

**Taking the unpredictable into account**

Even the most refined demand projection techniques will leave many factors inadequately accounted for, and certainly no technique can take into account developments that have not been anticipated. Planners can sometimes build into their demand model the possible effects of changes likely to occur during the planning period—whether the changes are by-products of the implementation of the plan or simply the result of other developments taking place independently of the plan, such as advances in medical technology. In many situations, however, changes may arise during the implementation of the plan that were simply not anticipated; whenever such changes become evident planners and administrators will have to revise their targets and projections taking the emerging developments into account. Table 6 lists six variables that could have a major impact on manpower requirements and costs. Although the possible effects of changes in these variables are difficult to quantify, the planner should reflect systematically on how a change in each could modify the plan projections.
### TABLE 4. PROBABLE EFFECTS OF SELECTED VARIABLES ON MANPOWER REQUIREMENTS AND COSTS

Technological advances. Advances in medical technology have led to major changes in how manpower is utilized, e.g. changes in the treatment of tuberculosis, venereal disease, and pneumonia. However, for two reasons these changes are unlikely to have much effect on total requirements. First, manpower formerly employed in the control and treatment of disease A are now freed to work on disease B, i.e., within each major manpower category functions may change but numerical requirements do not. Second, technological advances are apt to have a relatively much greater impact on the time allocation of auxiliary personnel among different activities than on that of health professionals. Since auxiliary training is short, it is comparatively easy to retrain auxiliaries as necessary to accommodate new technology and disease patterns.

**Quality of health care.** The effects of improved quality of health care on manpower requirements are difficult to predict and several alternative hypotheses can be postulated: (1) better and preventive as opposed to curative services. As in the case of quality, it seems unlikely that increased preventive services will result in a corresponding decrease in the demand for curative services. For many conditions expenditure on preventive services will have a greater effect on health and well-being than expenditure on curative services, but even the optimum expenditure on all significant preventable conditions is unlikely to alter substantially the demand for curative services. Conclusion: give priority to preventive services where justified but do not assume that this will lead to a net reduction in manpower requirements.

Accessibility of health services. Accessibility includes such factors as the distance and time that separate an individual from appropriate health services, as well as others such as cost, comfort, delay in being attended, convenience of clinic hours, and acceptability of the treatment received. In the case of health care it is often said that supply creates its own demand, and it seems reasonable to assume that if a health delivery system could achieve a rapid improvement in accessibility the demand for care, and hence for resources, would increase proportionately.

**Method of remuneration.** Studies carried out in various countries suggest that the method of remuneration for physicians and other health workers can have an important effect on the utilization of services. Accordingly, the possible impact on future manpower requirements should be taken into account if a significant change in remuneration methods is planned. The possible implications of each of the three major remuneration methods, assumed that other factors, i.e., the supply of health professionals and total expenditure on health care are equal, are as follows: Fee for service—more services per patient, more unnecessary services, substantially more expensive than either capitation or salary; Capitation—more services provided per patient, greater tendency to select services from necessary and non-unnecessary services; Salary—less incentive to provide unnecessary services, less outlay for services per practitioner though perhaps improved quality, less interest in patient's welfare. Conclusion—no necessary service, greater interest in patient's welfare, less likely for patients to change practitioners, theoretically increased incentive for practitioners to provide preventive services (though this has not been substantiated in practice), and increased incentive for practitioners to refer patients to specialists.

**Public as opposed to private sector.** Health care plans that postulate a substantial shift of emphasis from one sector to the other can have important implications for the number and kinds of manpower required. In general the public sector has the potential (but does not necessarily fulfill) to provide a better geographical and socioeconomic distribution of services, a higher average quality of care, and a greater emphasis on preventive care than the private sector has. Costs per person of services are often difficult to make, given the variations between the two sectors in resource inputs and hourly productivity, though the public sector has, potentially, substantially lower unit costs.

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SUMMARY

Assessment of the demand for health care is one of the most difficult tasks confronting the health manpower planner, but an essential one. As the planning process evolves, he needs to determine what variables are most correlated with the demand for manpower, how they are likely to change in the future in the absence of planned intervention, and to what degree they can be modified. This chapter considers four methodological approaches to the assessment of the demand, indicates the strengths and limitations of each, and sets out criteria for selecting the most appropriate method or methods for a given situation.

The concept of demand is subject to different interpretations. As used in health planning it extends over a continuum, one extreme of which is represented by professionally determined standards for meeting health needs, the other by the services likely to be demanded given the economic and other characteristics of health consumers. To avoid semantic confusion arising from the word “demand”, planners may find it convenient to use the more neutral term “requirements”, which does not carry with it implications about the methodological approach used.

Many factors influence the demand for health manpower, the size, distribution, density, economic characteristics, and health status of the population being among the most important. Social and cultural characteristics and practices affect both the public’s awareness of and the value it places on health care. Finally, the availability and accessibility of health resources and the efficiency with which they are utilized are significant determinants of the demand for health services and hence of the manpower needed to produce them.

The complexity of the situation in most countries usually requires that two or more methods of estimating the demand for health manpower should be used, each being applied to that part of the estimation for which it is best suited.

The health needs method is appealing to the planner because it rests on a scientific basis and seeks to provide optimum health care in response to the needs of the population. It is especially useful in planning preventive and public health programmes and in countries with a strong data base, a reasonably adequate health system infrastructure, and a strong commitment to planned change.

The service targets method involves setting targets for the production and delivery of specified health services, each set of targets being determined by the most appropriate method available. This method, like the health needs method, tends to be normative in its approach and to encourage active government involvement in shaping health care development. Its advantages include flexibility, the potential for disaggregating the several components of demand, and less stringent data requirements than for the health needs approach. Its limitations include the risk that unrealistic targets will be set and that the degree of control over sectoral change will be overestimated.

The health or economic demands method produces economically realistic projections that are consistent with past performance and provide planners with a powerful tool for studying the dynamics of demand. It is chiefly applicable to private sector planning and to countries whose government policies are more concerned with anticipating than with actively shaping future sectoral development and in which there are no large inequalities in access to care.

The manpower/population ratio method has been a favourite method in many countries, primarily because of its simplicity. It has several important limitations, however, since it tends to overlook the issue of productivity, does little to explain the
dynamics of supply and demand, and is not infrequently based on inappropriate or unrealistic ratios.

Regardless of the method used, reference standards are needed to calculate manpower requirements. They may be derived from past or current experience, from experiment, or from professional judgement or international comparisons. Task analysis and functional analysis are relatively new methods which may be useful in developing standards for application with one of the methods of estimating requirements.

The selection of an appropriate method or methods for the assessment of demand should take into account (1) the degree of government involvement in planning and health care delivery, (2) the quality of the available data base and of planning expertise, and (3) the degree to which the assessment results will be consonant with the general political, social, and economic context of the country and take into account past experience in the production and utilization of health manpower.
For the health planner "supply" usually refers to the availability and characteristics of resources or services at a given time, or at a future time according to specified assumptions about production, losses, and use. This can be contrasted with the economist's concept of supply as a curve derived from multiple points on a graph that show the dynamic interrelationships between the amount of goods and services available on the one hand and the price on the other. For both the manpower planner and the economist supply is the reverse of demand, though at times the distinction may be hard to make.

Manpower plans often tend to give more attention to the analysis of supply than to the study of manpower requirements. Supply data are easier to collect, supply estimates have the appearance of being more reliable than those of requirements, and supply data are apt to be solicited by many groups (professional associations, tax bureaux, manpower registries, etc.). Planners may be tempted to collect more supply data than they need or can readily handle, with the result that planning resources are spread too thin, a broad coverage of supply data is sought at the expense of accuracy and depth, the non-response rate becomes high, and the study results are inconclusive.

Supply analysis has three main components, the effort that should go into the study of each component depending on the principal problems existing or anticipated. The components (illustrated in Fig. 7) are:

- **Current supply**, the current stock of qualified health manpower. This stock has two subcomponents, the *active supply*, persons employed or seeking employment in the health sector, and the *inactive supply*, qualified persons potentially able to serve in health occupations who are either retired or engaged in other activities.

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2 Appearances may be deceptive, however, as was demonstrated in a paper on health manpower in developing countries prepared in 1971 by WHO. Four projections of the supply of Indian physicians in 1961 gave results varying from 72,000 to 91,458, the highest figure being 34 1/2% greater than the lowest. Even developed countries, with their better statistical data base, have similar problems, as was shown by W. L. Elwood in his article, "An appraisal of physician manpower projections". *J. Am. Med. Assoc.* 200:133 (1969).

3 The conventional definition of supply (or of the active labour force) includes those who are actively seeking employment as well as those who are employed. In practice the number seeking employment are usually very small and difficult to estimate with precision and the planner may choose to ignore them.
Future increments, probable additions to the stock of qualified persons. In projecting these increments planners need to consider the available pool of potential recruits for health occupations, the actual, planned, and potential capacity of the country's health training programmes, and attrition within the training programmes.

Projected losses, including the expected losses from attrition over time from both the current supply and future increments.

FIG. 7. COMPONENTS OF HEALTH MANPOWER SUPPLY

Before considering supply assessment in detail, it should be recalled that the manpower situation in a country is dynamic, not static. The data collection and analysis methods described here can provide a good picture of the situation at a given time, but the information will be far more useful if the basic data are obtained periodically. With multiple rather than single points on the graph trends can be identified, programmes evaluated, and data reliability assessed. The key to this is the health manpower information system discussed in Chapters 1 and 2, of concern not only to planners but also to health statisticians, educators, and indeed to all others dealing with manpower problems.

Current Supply

Whom to study

Several general principles provide useful guidance in the selection of manpower categories requiring study. The highest priority should be given to important categories for which something can be done. If
manpower costs are to be considered, the categories that account for the major part of expenditure should be included; if, however, certain high-cost categories are to be excluded, their costs must be adequately isolated from those of the rest of the health team. In a comprehensive analysis most planners would be well advised to study less than 20 distinct manpower categories and preferably less than 15, and not feel obliged to collect fully comparable data on all categories but rather establish a hierarchy according to which some categories are studied intensively and others more superficially. If some manpower categories usually work in a team relationship with others, it is probably desirable to include all members of the team.

To be included in a manpower study or statistical data system is to be "important"; accordingly, no organized manpower category will want to be left out of consideration. To sort out the categories requiring priority attention, the planner can make a master list of all the significant manpower categories and, within each major category such as nursing, identify two or three different levels of training and function. He should then ask questions of the kind listed below to determine the relative priority of each category for inclusion in the study. As a general rule, the greater the number of affirmative answers for a given manpower category, the greater the importance of including it in the supply analysis.

Magnitude. Is the category numerically relatively large or are its future requirements expected to be large? Has it or will it have a manpower shortage or surplus? Would a shortage or surplus have an adverse effect on health services delivery?

Training. Is the training for the category long or costly? Is the health sector, including its educational institutions, primarily or exclusively responsible for the training? Is there a substantial delay between deciding to change the manpower supply and effecting the change?

Information requirements. Is the current information on the category adequate for planning? Will it be relatively easy to improve the information on it? Are resources or collaborators other than in the planning unit available to help collect and analyse the data?

Feasibility of government intervention. Is the health sector the major or the sole employer of the category? (Veterinarians, social workers, and statisticians, for example, are largely employed outside the health sector.) Is the public sector the major or the sole employer? (In some cases most of a manpower category are active in the private sector, hence of relatively low interest to government agencies. It should be noted, however, that in many such situations public and private sector personnel are in dynamic equilibrium and therefore the public sector will be obliged to take into account the private sector demand if its own requirements
are to be met.) Can information on the category be readily used for the formulation of policy and the taking of action?

Other criteria. Are there any non-technical reasons for not excluding this category? (Occasionally a category may receive a low rating on most of the other criteria but its exclusion would be unwise for political or public relations reasons.)

Traditional health workers. The potential contribution of indigenous practitioners and healers to health care in many developing nations has received increasing attention in recent years. A distinction may be made between indigenous health workers who have received theoretical and practical training based on an organized approach to diagnosing and treating disease (e.g., Ayurvedic physicians in India, Chinese herbalist doctors) and those who have not (native healers, curanderos, witch doctors). Some countries, notably India and China, have made extensive use of the former, and a few are experimenting with the use of the latter as important adjuncts to the formal health system. In a report to the Twenty-seventh World Health Assembly, the Director-General of WHO urged Member States to give increased consideration to using both types of personnel, along with auxiliaries and traditional midwives, to help compensate for the acute shortage of health professionals that will affect health services for a long time to come.1

Although studies in a number of countries have sought information on traditional health workers, the decision whether to conduct a survey of them is difficult and should be taken with care. The numbers are large, many are engaged in health activities only part-time, their contribution to health care may be marginal, the prospects for effectively utilizing some categories are low,2 and to link the traditional and modern health sectors functionally will generally require that both the traditional practitioners and those health workers they are expected to interact with need special training. As with the other data under consideration, the potential utility of the information to be obtained must be carefully weighed against the substantial cost of collecting it.3

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1 For a detailed discussion of the provision of primary health care by non-physicians, including traditional health workers, see Chapter 8.

2 For example, a 1964 survey covering 90% of all Turkish villages identified more than 85,000 health workers outside the formal health system, including 39,731 traditional birth attendants, 30,273 midwives, 14,545 osteopaths, 11,512 housewives, and 2,651 others, for one traditional health worker per 300 population (TAYLOR, C. T. et al., Health manpower planning in Turkey: an international review. Baltimore, Johns Hopkins Pres, 1968, p. 186). In China (Provincial of Taiwan), although the ratio in the population was lower than in Turkey, the level of functioning of traditional practitioners was considerably higher. One study showed there was almost one Chinese herbalist doctor to every 2,400 Chinese physicians, with the herbalist providing about 1.5 visits per capita in 1963 (HAYES, T. D. & PERLMAN, M. Health manpower in a developing economy. Baltimore, Johns Hopkins Press, 1967, p. 71.)

Data requirements

The planner should decide what information to collect in the same general way as he selected the manpower categories to analyse. There are three main categories of factual information: (1) personal characteristics; (2) training and other qualifications for the job; and (3) job characteristics, including job location, time spent on the job, time distribution among various activities, and number of activities performed. Some of these characteristics are permanent (e.g. year of birth, sex, year of graduation from professional school), while others are subject to change (e.g. work location, hours worked). If a country is studying a given manpower category for the first time both types will need to be considered, but as soon as possible it should develop a manpower data system capable of keeping on permanent file the unchanging characteristics while periodically updating the others. Table 7 lists information items to consider in the three main factual categories, while attitudinal or other non-factual information is discussed later on in this chapter.

In selecting the information to include in his analysis the planner should consider: (1) the relevance of the information to the principal supply problems already identified; (2) the method of assessing manpower requirements to be used (see Chapter 3); (3) the resources and time available for collecting data; and (4) the decision to use primary (direct) or secondary (indirect) information sources. With regard to (4), if only secondary sources are to be used for a given manpower category the options open to the planner are limited. Conversely, if a special survey or census is needed to obtain data, additional questions can be included that might otherwise not be justified.

An important concept in manpower planning is that of full-time equivalent (FTE) personnel. This allows the planner to convert less than full-time personnel into their full-time equivalents so that comparisons of personnel utilization can be made between programmes. Unless FTE professionals are calculated for some categories such as physicians holding multiple jobs, the aggregate number of professionals working in several different categories may exceed the total number of persons identified in the survey. FTE estimates can be derived only if there are data on the number of hours (or days) per week spent in each of the various jobs under consideration. An FTE may be defined arbitrarily by equating it with the number of hours worked in a full-time government or private sector position (e.g. 40 hours per week, 1750 hours per year), or empirically by dividing the estimated total number of hours worked during a given period of time by the number of persons contributing work hours (e.g. 52,000 hours by 1400 persons in one week equals 37.1 hours per person).
### TABLE 7. INFORMATION OF POTENTIAL UTILITY IN THE ASSESSMENT OF SUPPLY

<table>
<thead>
<tr>
<th>Information items and principal uses of each (Items marked by an asterisk are likely to be the most important)</th>
<th>Comments regarding collection, analysis and utility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Personal characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>* Age. Used to estimate future losses.</td>
<td>Year of birth; alternatively, year of graduation. For the latter the average age at graduation for each cohort of graduates can be assumed. Relatively easy to collect by indirect means.</td>
</tr>
<tr>
<td>* Sex. Used to estimate future losses. There is usually a differential loss rate by sex.</td>
<td>Usually readily identified from the name or available from school or personnel records.</td>
</tr>
<tr>
<td>Place of birth and/or nationality. Used to verify the extent of immigration into the country.</td>
<td>Nationality at birth is the essential point, not place of birth. Likely to be of importance only in countries with substantial immigration.</td>
</tr>
<tr>
<td>Marital status. Sometimes useful in anticipating future losses in predominantly female occupations.</td>
<td>Generally not worth the trouble, since usually relevant in very few manpower categories.</td>
</tr>
<tr>
<td>Race and/or ethnic background. Useful to ensure an adequate racial distribution of the manpower supply if important in the country.</td>
<td>May be difficult to obtain and endanger the acceptability of other aspects of the study. Potential utility must be carefully weighed.</td>
</tr>
<tr>
<td>Home residence. Important only if a permanent manpower registry is planned.</td>
<td>Of doubtful value unless for a registry. Subject to frequent change.</td>
</tr>
<tr>
<td><strong>II. Manpower qualifications</strong></td>
<td></td>
</tr>
<tr>
<td>* Type of health-specific training. Used to classify manpower into the various categories of medicine, nursing, dentistry, etc.</td>
<td>For the professions in general defines the type of training received. For some auxiliary categories and occasionally for professions that have a surplus, there may be notable differences between the basic training and the job being performed (e.g., pharmacists may be serving as laboratory technicians). Information relatively easy to obtain.</td>
</tr>
<tr>
<td>* Year of graduation from health-specific training. Used with records of training institutions to check possible survey omissions and estimate the loss rate among professionals.</td>
<td>If the basic information is obtained from the training institutions, the year of graduation is usually available; otherwise, it is usually obtained from the individual. A decision should be made whether to use the year of graduation or the year of licensure or certification to practice; these are often different. The former is usually preferable since it is not to be more accurate.</td>
</tr>
<tr>
<td>* Years of general education. Used to determine the adequacy of the general educational level of non-professional personnel.</td>
<td>Generally not useful for professional categories since they tend to have a standard general education, e.g., a secondary school certificate. For auxiliary personnel the number of years of general education is usually sufficient to classify them into &quot;adequate,&quot; &quot;marginally adequate,&quot; or &quot;insufficient&quot; according to present or proposed standards of general education. The information can be time-consuming to obtain and is often not included in official records.</td>
</tr>
<tr>
<td>Institution(s) where the individual received health-related training. May be useful in determining whether graduates from different institutions have different types of practice, specialty, location, loss rates, and perhaps performance.</td>
<td>Information easily obtained from training institution records. Otherwise usually obtained directly from the individual since personnel records may be incomplete. In most cases of marginal utility.</td>
</tr>
<tr>
<td>Licentiate status. May be necessary in some cases where there are discrepancies between registration, allowance to practice, and the number actually practicing.</td>
<td>The merits of getting specific information on this point should be considered carefully. A manpower survey could become seriously compromised if used as, or perceived as, a measure of the profession's quality. Including this item may make it more difficult to obtain complete and reliable information from the rest of the survey.</td>
</tr>
</tbody>
</table>
### TABLE 7 (continued)

<table>
<thead>
<tr>
<th>Information items and principal uses of each (items marked by an asterisk are likely to be the most important)</th>
<th>Comments regarding collection, analysis, and utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate specialization and certification, Importance usually limited to professional categories. May be of some use in assessing the supply of specialist professional manpower.</td>
<td>In the absence of established specialist training and certification, set to be difficult to obtain and analyse and not very useful. Specialty training can vary from lengthy medical residency or recognized degree programmes (e.g. public health) to one-week or two-week seminars, workshops, correspondence courses, certificates of attendance, etc. The need for this information should be well established and it should be collected only when there is a clear end-point to the training (e.g. a postgraduate degree or a specialty diploma or certificate).</td>
</tr>
</tbody>
</table>

### III. Work-related characteristics

| Institutions setting, Manpower distribution in relation to the employers or public or private sector and correlation with access by the population served by these specific institutions or sectors. | It is seldom necessary to tabulate the institutional job distribution by more than 10 main categories. When a category accounts for less than 4-5% of the total, it should be consolidated into a larger category, e.g. missionary health programmes. The problem of multiple employers may be sufficiently important in some countries to require a special study. |

* Type of work performed and approximate distribution of time according to major activity. Essential in order to characterize manpower utilization, evaluate productivity, and estimate future requirements using a disaggregated approach. | The four main work categories to distinguish are services to people, administration, teaching, and research. The first can be further subdivided into direct clinical services to patients, indirect clinical services (teser services to patients, e.g. laboratory or X-ray examinations, social services and support services, or health education, environmental sanitation). Further subdivisions may be indicated according to the specific activity or specialty. It is usually not necessary to differentiate among the various work activities of many professional categories such as nurses, auxiliaries or laboratory technicians, where the job title is a sufficient indication of what is done. Among physicians and certain other professional categories a substantial number of persons may have multiple activities; hence they must be questioned regarding the time allocation among them, a time-consuming process to be carried out only if the rest of the study design justifies it. The level of data disaggregation proposed above does not preclude a time-motion study, which can be very costly. |

| Number of services performed. Potentially of great use in assessing work productivity, characterizing manpower utilization, and helping estimate private practice income. | Depending on the type of work and the manpower category, this kind of information can vary from being easy to being very difficult to obtain. The cost of obtaining it can be high and, unless care is used, the reliability of the data may be low. Possible data to collect include the number of services (laboratory tests, X-ray examinations, etc.) performed and the number of home visits made. They should be collected on a sample basis only and the sampling period should be relatively brief (e.g. 4-8 weeks) and representative of the usual workload. |
TABLE 7 (continued)

<table>
<thead>
<tr>
<th>Information items and principal uses of each (items marked by an asterisk are likely to be the most important)</th>
<th>Comments regarding collection, analysis, and utility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functional specialization.</strong> Information about specialty practice is useful for some professions, particularly those in which specialty training is required, e.g., physicians and perhaps dentists, particularly to establish career trends, identify emerging shortages and surpluses, and orient postgraduate training programmes.</td>
<td>In most developing countries specialty practice is relatively limited and tends to represent certain activities or patients or activities rather than exclusive dedication to a specialty. Care should be used in interpreting data on self-declared specialization, which may or may not coincide with information obtained about specialty training and certification (see above). In many cases this information has limited utility.</td>
</tr>
<tr>
<td><strong>Job title and classification.</strong> May be useful in correlations between job title and type of work actually performed, since in some countries these may be in substantial disagreement. Data is usually used only with reference to the public sector.</td>
<td>Although collection of this information often seems a good idea, its utility is limited and the work required to code, tabulate, analyze, and synthesize the data is substantial. Best applied on a small sample in relation to specific problems.</td>
</tr>
<tr>
<td><strong>Amount of time lost from work.</strong> Estimates of the average amount of time lost from work through vacations, sick leave, study leave, etc., can be used to refine projections of the number of persons required to produce a given quantity of services.</td>
<td>For most professions the time lost from work can be readily estimated from personnel records and past experience. The information is necessary only when the method used to project requirements calls for the production of a given volume of services. It is therefore usually of marginal value, justifiable only when there is evidence that a given professional category is losing more than 15–20% of work time for inadequately identified reasons.</td>
</tr>
<tr>
<td><strong>Past working history.</strong> Knowledge of the past working history of a sample of health workers may be useful in some special situations to indicate how the typical working career evolves and the determinants of or correlations between past experiences and subsequent decisions. The relevant data include the type of job, the employer, the location, and the length of time in the job.</td>
<td>Can be very expensive and time-consuming to obtain and complicated to analyze; the full working history of persons in their 40s or 50s, for example, may contain numerous job changes that defy ready tabulation. Moreover, rapid developments in health sector employment may make retrospective analysis of limited use for anticipating the future. Such information should be obtained only after carefully weighing the pros and cons and on a small sample of respondents.</td>
</tr>
<tr>
<td><strong>Job income.</strong> Used to estimate manpower costs and rate of return of different professions, and to assess income differentials in the public and private sectors and in different kinds of health activity.</td>
<td>Public sector incomes are usually readily available from institutional sources. Private sector income estimates require special techniques and may generate controversy.</td>
</tr>
</tbody>
</table>

In estimating the hours worked, a standard method should be developed in advance to deal with practitioner time spent on call at night and during weekends and holidays, because some may report these hours as work while others do not. Some correction may also be necessary to take into account the declining productivity of professionals as they approach and pass the usual retirement age.

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1 Productivity estimates that include on-call time may result in a significant and misleading reduction in the hourly productivity of service. It would be preferable in such cases to report on-call time separately and add it to regular hours on the job and make productivity estimates individually for each activity.

2 Some statistical systems assume that productivity estimates are based on supply estimates, which are usually assumed to be constant up to a certain age, while others assume a standard reduction in the amount of time an average practitioner works, e.g., 20% fewer hours after the age of 60.
Attitude surveys

In addition to the factual information just described, non-factual information can be collected about the opinions and attitudes of a sample of health workers. For policies on manpower redistribution, on the modification of health care organization or remuneration patterns, or on the introduction of a new kind of health worker, it may be important to know what the manpower categories most likely to be affected think of the main alternatives under consideration. Such studies can help greatly in assessing the acceptability of each policy option, but they are apt to be costly and, without adequate attention to design and execution, they may end up by being inconclusive. Several observations are relevant in this connexion.

1) The survey objectives need to be sharply defined and limited to areas where the information can reasonably be expected to influence policy. Otherwise, planners and social scientists may be tempted to include questions in the survey that satisfy the curiosity of the sponsoring agencies but have little bearing on decision-making. Such questions complicate the analysis, dilute the survey results, and may antagonize the respondents.

2) The sample size should be kept relatively small, the economies resulting being used to ensure a high response rate and allow for a more detailed questionnaire. A large sample usually means a rather superficial questionnaire, and quality control and an adequate response rate may be difficult.

3) Questions that involve considerable thought, the recall of experiences and impressions from years past, the ranking of a wide variety of alternative responses, or a selection among alternatives that bear limited relation to the respondent’s current circumstances are apt to provide little useful information.

In sum, while attitude and opinion surveys can be useful adjuncts to other sources of information on manpower supply, they are of marginal utility and the costs and risks involved are significant. Planners should therefore be especially careful in the design and execution of such studies to make sure that they fulfil expectations.

Sources of supply data

There are three main sources of supply information:

1) Official sources (licensure boards, legally sanctioned professional registries, tax offices, official statistical bulletins on health resources and resource use, payroll and personnel records, etc.)

2) Non-official institutional sources (membership rolls of professional societies, personnel and statistical records of private hospitals and other
institutions, lists of practitioners qualified to receive reimbursement from insurance companies, telephone directories, lists of practitioners prepared by pharmaceutical companies, etc.)

(3) Primary field data sources (surveys of individuals by mail, telephone, personal interview, etc.).

Once the overall statistical requirements have been established, all the readily available published information as well as untabulated but potentially useful information should be reviewed for its completeness, coverage, accuracy, up-to-dateness, and relevance. If gaps are found, the complementary information required can be determined.

Special surveys. Manpower census or sample surveys should be carried out only if the necessary data are not available from other sources. The most important of the principles and special procedures shown by past experience to be useful in conducting a survey, whether of individuals or institutions, are as follows.

1. Unless the number of persons in the manpower category is small or those to be surveyed can be easily identified, a sample survey should be made. Professional associations will often volunteer assistance for a census of an entire profession, but their capacity for help may be limited and the planning unit may end up by completing the census. If an entire manpower category is to be surveyed the planner should also develop an appropriate sampling framework in advance, so that if the non-response rate subsequently becomes excessive a survey can be made to obtain reliable data.

2. If resources permit, it is desirable to develop a master list of names by profession of the manpower categories to be surveyed. These names are preferably obtained from the lists of graduates and foreign degree validations of training institutions, or alternatively from professional registries, with indication of such basic data as may be available (year of graduation, profession, sex, etc.). This information can be transferred to electronic data-processing cards for the easy preparation of lists by alphabetical order or other characteristics. The master list greatly facilitates the task of completing the survey, drawing subsamples, identifying those lost to the follow-up, and supplying the basic characteristics of those not found. If a master list is not prepared, estimates should be made...

1 Wheeler, for example, used telephone directories for the major cities in Kenya to estimate the present supply of physicians in private practice. He argued that the estimates were fairly complete since virtually all licensed physicians practicing in rural areas were employed publicly, and data were available on them from the Ministry of Health. See Wheeler, M., Medical manpower in Kenya: A projection and some of its implications. *East African Medical Journal*, 46 (2/3):101 (1969).

2 For an example of how all the secondary sources can be used for essential data, see: Yauh, C. L., et al., *Journal of the Formosan Medical Association*, 76:133-134 (1977). Yauh describes the nurse-midwife component of a survey throughout the Province of Taiwan in which eight different secondary data sources were used to provide information on all the nurse-midwives. Sources used included licensure data, lists of graduates of nursing and midwifery schools, rosters of professional societies, and emigration lists.
in advance of the number of persons likely to appear in each category, e.g. the expected number of living and of professionally active physicians or dentists. This can usually be done with reasonable accuracy by taking the number of graduates and foreign degree validations during the past 40-45 years and adjusting the total downwards for the estimated number of deaths, retirements, and emigrations that have occurred. Procedures for estimating manpower losses are described later in this chapter.

3. For the survey findings to be reliable, the proportion of persons who cannot be located or are non-respondents should be kept low, below 30% and preferably below 20%. One sampling procedure that can help minimize losses is to select graduation classes at approximately five-year intervals. This will provide a 20% sample and a good distribution according to age, and facilitate the finding of persons not readily located. At the end of the first phase of the survey at least 50% of the persons sought should have been located. Selected and knowledgeable individuals from among the group located can then be shown the names of those not yet located and frequently they can inform the survey team about their classmates' whereabouts. International organizations, newspaper obituary columns, pension funds, and lists of retired persons are also useful sources of individuals not located in the sample.1

In surveys of individuals it is likely that a significant percentage cannot be interviewed or surveyed directly. Whenever information is not obtainable through the regular procedures, much of the information desired can often be obtained from other sources such as employers, work associates, and friends, as long as the questions do not relate to sensitive matters such as income. This procedure can help keep to a minimum the number of individuals about whom absolutely no information can be obtained.

4. Personnel and statistical offices within the health system are not always effective vehicles for distributing questionnaires and collecting information. These offices are designed for other purposes and are often understaffed, and if a special survey is added to their work a very low response rate may be obtained. Supplementary personnel and/or overtime payments to the existing staff may help in overcoming these problems and the use of special survey staff may be avoided.

5. The planner should be sure to make provision for persons on vacation, sick leave, or travel and either obtain information from indirect sources or arrange to collect it later. This group can easily account for 10% or more of the active labour force. When all the normal follow-up procedures have been completed, a sample of the non-respondents can be drawn and intensive efforts made to survey them through telephone or

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1 If the number of persons presumed active in the older cohorts is low, the sampling fraction may have to be increased in order to obtain a sufficient number of observations from which to draw valid conclusions.
personal interview. The responses of this group are then compared with those of the respondent group to see if there are any significant differences between the respondents and the non-respondents. If none is found, relatively high non-response rates can be more easily tolerated.

6. To stress once more a basic principle underlying those above, within the constraints of time and money completeness and accuracy of the data should have higher priority than breadth of coverage. A 20% sample with an 85% response to 25 questions provides far more useful information than a 50% response to 10 questions submitted to the entire population. To ensure the validity of the survey, the planner needs to carry out spot checks on small samples of the responses to protect against data falsification, inaccuracies, or incompleteness, and to determine in advance how to handle special problem groups such as interns or other health professionals under training.

**Losses**

Manpower planners need to take into account the probable losses (or attrition) from the current manpower supply and new graduates. As shown in Fig. 7, the sources of loss of manpower are deaths, retirements, emigration, temporary or permanent withdrawal from the labour force prior to retirement, and changes in occupation. The relative importance of these sources varies considerably according to occupation, the country’s level of development, the nature of the health system, and other factors. Most losses from a stable manpower group such as physicians in a developed country are attributable to death and retirement. In a developing country, however, physician losses owing to death and retirement may be minimal because of the relatively young age structure of the physician population, while losses owing to emigration may be substantial or even dramatic.¹ While emigration may not be a significant factor for most other professions, other factors can lead to substantial manpower losses. Examples include: a low private sector demand for dentists, pharmacists, and trained midwives; failure to create sufficient public sector technical and auxiliary-level jobs to accommodate the training institutions’ output; salaries uncompetitive with those of comparable jobs outside the health sector; societal pressures discouraging the employment of women, especially if married; and institutional rigidities restricting part-time employment or otherwise compounding the difficulties of working women with families.

¹ The rates may exceed 70% of the medical school output in some cases, with a permanent loss to the country, after correction for the eventual return of those who have obtained postgraduate qualifications abroad, of over 50%.
If the major causes of attrition are other than death and retirement, it is important to identify the factors that contribute to early withdrawal from the active manpower supply. The following are among the principal factors affecting manpower productivity and occupational stability.

1) Monetary factors, both direct salary considerations and indirect considerations such as fringe benefits, opportunities of private practice for those employed in the public sector, and prospects of salary increases.

2) Intellectual satisfaction, a particularly important factor for educated persons asked to serve in remote rural areas where professional intercourse is limited.

3) Dedication and service, difficult factors to quantify but important for many health occupations. Although they are basically personal characteristics, some countries such as China and Cuba have shown the extent to which they can be influenced by policy.

4) Rotation and advancement, which should involve clearly understood patterns and established procedures for promotion or further training.

5) Working conditions and job security, which should include the assurance that professional activities will not be restricted because of an individual's sex, race, social class, or political affiliation.

6) Facilities, supplies, and equipment enabling the personnel to perform their tasks unhindered by shortages.

7) Prestige, in terms both of the occupation in relation to others in the health field and of the value placed on it by society in general.

After a preliminary review of the situation based on the statistics available and the views of knowledgeable informants, the planner may wish to survey a sample of persons in the age or occupational groups most susceptible to high loss rates or, ideally, of those who have recently left employment. Although the responses of the latter are of particular interest, the difficulty of locating them and obtaining their cooperation may make such a study expensive. In designing survey questionnaires it is important not only to identify the presumed reasons for leaving (or planning to leave) health sector employment but also to inquire about antecedent factors, factors that could persuade (or could have persuaded) respondents to continue employment and, in the case of those who have already left, any realistically feasible changes in the job situation that could induce them to return.1

In the actual projection of losses, the planner has several standard methods available to him, the more common of which are described below.

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Life table method. This method consists of developing a life table for the profession under consideration. In a few countries this can be based on actual data; more commonly, however, the data are insufficient to establish reliable rates. Alternatively, a proxy table can be constructed in one of several ways: (1) in countries where the life expectancy is reasonably long and statistics are good, life tables can be derived from the national population; (2) if reliable life tables are not available or the life expectancy of the general population is relatively lower than might be expected for health professionals, a United Nations life table giving a somewhat higher life expectancy can be used. In either case the planner should calculate the loss rates independently for male and female health personnel, since the life expectancy differs considerably for the two sexes. The life table can only provide for losses owing to death, and in most cases this accounts for much less than 50% of all losses, especially in the older age groups.

Cohort method. Loss rates are calculated by comparing cohorts of past graduates or licentiates with the numbers in each cohort found to be professionally active at a more recent time. By this means loss rates are calculated as a function of time. The observed loss rates from the past are then applied to each cohort of professionals active in the base year of the manpower survey in order to determine the number likely to be active in future years. This method has the advantage of taking into account all the sources of loss including retirement, emigration, death, disability, and change of job. The assumptions implicit in the method are that the baseline data on the number of persons starting each cohort and the number found in the census are accurate and that the factors affecting losses will continue unchanged. This last assumption may be particularly hazardous in some countries where the losses are owing primarily to causes other than death, disability, and natural retirement. Such causes as emigration and job changes because of insufficient health sector

1 A table giving the life expectancy at specified ages for each sex is given for a number of countries in the Demographic Year Book 1971, New York, United Nations, 1974 (Table 18, p. 330). The table is not broken down by occupational groups.

2 A cohort is a group of persons who have experienced an event during a common period. Thus the birth cohort of 1950 includes all persons born in that year, the cohort of 1955 includes all those who graduated in that year. Five-year and ten-year periods are also frequently used.

3 In a recent comprehensive study on the supply of health manpower to 1990 in the USA, the Department of Health, Education, and Welfare used a modified cohort method for projecting losses from the labor force. For most occupations for which supply projections were made, the estimates of deaths and retirements were computed using age-specific separation rates for the general working population as a starting point. Adjustments were then made where the data permitted according to the different age distributions of the occupations and their individual death and retirement patterns. The following limitations of the method were noted in the study report: (a) the same separation rates were applied for the full 20-year projection period (1970-90), although composition changes among graduates in the coming years (e.g. an increase in the number of women and of graduates from minority) could significantly change the estimates in a number of occupations; (b) the loss patterns of today are likely to be different from those over the next 20 years, and the same patterns may not apply to the future; (c) the method does not take into account that may significantly affect retirement increased emigration of currently employed workers who may become international health workers;

demand may change substantially over time and lead to erroneous projections.¹

The cohort method is best suited to a normal attrition pattern in which the loss rate is very small during the first years following graduation, increases gradually through the third and fourth decades, then increases sharply as each cohort enters the sixth decade of life. Table 8, based on hypothetical cohorts of 1000 male and 1000 female graduates, presents typical retention rates for professionals not subject to unusual losses from emigration or job changes and shows how the loss rates can be used to project the future supply of professionally active manpower.

**Approximations.** In the absence of more refined information, reasonable approximations can be made quickly. In a country where the supply of male health professionals is reasonably stable in relation to a slowly growing population, the annual loss rate is likely to be close to or slightly in excess of 2.0%.² If the supply became stabilized with zero growth, the mean age would be in the low 40s and the loss rate around 2.5%, suggesting an average working life of 40 years. If job opportunities are adequate, few males will leave the profession for causes other than death or disability. In most developing countries the professional manpower categories are still in a rapidly growing phase, and as a result the average age is much lower than in North America or Europe. During this phase, a 1.0–1.6% annual loss rate is reasonable in predominantly male professions as long as emigration and job transfers are not significant problems; but this is seldom the case and, indeed, in quite a few countries the loss rate may be well in excess of 2.0%.³ For predominantly female professions the loss rate, assuming a young average age, would be about 2.4–2.5% per year. Approximate correction factors can be applied to take into account such factors as emigration and early retirement. Table 8 gives typical loss rates for male and female professional cohorts taken at five-year intervals in a developing country and these can be applied in the absence of better data. Note the slight rise that may be expected in predominantly female professions owing to the return of substantial numbers of women

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¹ This was precisely the problem encountered in the Peru health manpower study, in which the percentage of physicians and dentists active in the first decade following graduation was lower than for subsequent decades, presumably owing to an upward trend in emigration resulting from a doubling of the supply of professionals in the ten years prior to enumeration. The cohort method without modifications would have presumed that all these professionals would return to Peru in the second decade after graduation, to initially development. Alternative supply projections were made assuming (a) that the return would take place and (b) that the loss was permanent. See: HILL, T. L. *Health manpower in Peru: a case study in planning.* Baltimore, John Hopkins Press, 1969, p. 119-121.

² In an interesting study of French physicians it was estimated that, as a result of a projected increase in the supply of physicians during the 1968-86 period, the average age would drop from 44.6 to 44.8 years and the loss rate from 1.5% to 1.2%. These estimates suggest how sensitive the loss rate may be to changes in the age structure. (BRANQON, P. & PELZUER, J. *Ages de la sortie de la médecine militaire.* *Cahiers de Sociologie et de Demographie medicale,* 9:223-235 (1980)).

³ In a study in India, Wanjoo assumed an annual attrition rate for medical school graduates of 2.8% for the years 1951-60 and 2.5% for 1961-69. (WANJOJO, M. *Health manpower in a developing economy: India, a case study.* *Indian Journal of Public Health,* 17 (2):35-46 (1975)).
<table>
<thead>
<tr>
<th>Date when licensed</th>
<th>Number licensed</th>
<th>Average years since licensure</th>
<th>Observed to be active in 1975</th>
<th>Projected to be active in 1989</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Male physicians (average age at licensure = 23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1925-33</td>
<td>1000</td>
<td>48</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>1935-39</td>
<td>1000</td>
<td>34</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>1940-44</td>
<td>1000</td>
<td>33</td>
<td>30</td>
<td>14</td>
</tr>
<tr>
<td>1945-49</td>
<td>1000</td>
<td>33</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>1950-54</td>
<td>1000</td>
<td>33</td>
<td>50</td>
<td>14</td>
</tr>
<tr>
<td>1955-59</td>
<td>1000</td>
<td>33</td>
<td>60</td>
<td>14</td>
</tr>
<tr>
<td>1960-64</td>
<td>1000</td>
<td>33</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td>1965-69</td>
<td>1000</td>
<td>33</td>
<td>80</td>
<td>14</td>
</tr>
<tr>
<td>1970-74</td>
<td>1000</td>
<td>33</td>
<td>90</td>
<td>14</td>
</tr>
</tbody>
</table>

| Female nurses (average age at licensure = 22) |
| 1925-29            | 1000           | 20                            | 10  | 14   | 10  |
| 1930-33            | 1000           | 20                            | 20  | 14   | 20  |
| 1935-39            | 1000           | 20                            | 30  | 14   | 30  |
| 1940-44            | 1000           | 20                            | 40  | 14   | 40  |
| 1945-49            | 1000           | 20                            | 50  | 14   | 50  |
| 1950-54            | 1000           | 20                            | 60  | 14   | 60  |
| 1955-59            | 1000           | 20                            | 70  | 14   | 70  |
| 1960-64            | 1000           | 20                            | 80  | 14   | 80  |
| 1965-69            | 1000           | 20                            | 90  | 14   | 90  |
| 1970-74            | 1000           | 20                            | 100 | 14   | 100 |

* The numbers in this table are drawn from a number of country studies and represent a composite estimate of the manpower loss rate over time in an idealized situation where there are virtually no losses from emigration or abandonment of the original profession in favour of another profession.

The data presented reflect the manpower losses due to death and retirement. The number of personnel in the active labour force once their children reach school age. This phenomenon may be quite pronounced, as is evidenced in Fig. 8, which is based on the retention rate of Turkish nurses as a function of years since graduation.

Persons working beyond the presumed retirement age can either be discounted by a certain fixed percentage or arbitrarily eliminated from the estimation of actively employed manpower. Special studies will probably be necessary to determine what proportion of those in early and voluntary retirement (e.g. nurses or social workers) might be attracted back into active employment under specified conditions in relation to, say, availability of refresher training, part-time duty, or child care. 

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1. The average age at retirement may change rapidly over time and require close monitoring. For example, the percentage of French physicians remaining active beyond the age of 65 dropped steadily during the period 1956-67 from 37.6% to 46.1%, this presumably reflecting improving economic conditions and earlier retirement (RE-DAVIS et al. DHAN). Le corps médical français en 1983: projections démographiques. *Concurs medicat*, 22 (3):488-490 (1970).
ence suggests that it is hard to increase the average retention rate of a predominantly female profession above 70% once the profession is no longer in rapid growth and a fairly stable age distribution has been obtained for all graduates.

**FIG. 8. ESTIMATED PERCENTAGE OF REGISTERED NURSES IN TURKEY ACTIVELY EMPLOYED IN NURSING BY INTERVAL AFTER GRADUATION**

*From: Taylor, C. E. et al. Health manpower planning in Turkey: an international research case study, Baltimore, Johns Hopkins Press, 1976, p. 141* (by permission). A similar pattern has been found in various other studies.

**Future Increments**

In relation to future increments in the supply of manpower, three main questions need an answer.

1. Given the existing or the planned educational capacity, how many new graduates or trainees will be produced in future years?

2. What internal factors (such as student losses, the availability of funds, teaching facilities) could be modified so as to improve the quantitative or qualitative output of training institutions, and what are the maximum
enrolments possible in those institutions if it becomes necessary to increase the manpower supply?

(3) What external factors limit current school enrolments and effective output? Examples of such factors are an insufficient supply of qualified applicants, poor coordination between educational programmes and licensing bodies, and lack of coordination between national health planning and health manpower planning.

Data requirements

The major categories of information required to project future increments to health manpower are described below, along with some suggestions about data collection and analysis. A word of caution, however, is warranted. The planner who obtains this information may be doing an excellent job of "rational" planning, but in the process he may so neglect political and social realities that his results are of little value. Examples of such realities abound: student pressures that oblige governments to tolerate medical school enrolments far in excess of the country's ability to absorb the graduates; professional pressures that make training institutions employ many part-time and occasional faculty members as a means of reducing underemployment; and legislative pressures that bring about the creation of unnecessary or unsustainable educational institutions. The "realistic" planner will use the categories below as a starting-point as he develops detailed data requirements responsive to the realities of the situation.

The planner should bear in mind that his may be one of the many countries where most health training institutions have no formal links with the ministry of health and perhaps even only tenuous links with the ministry of education. He must therefore be circumspect in requesting information; if he asks for detailed information, too, he may be obliged to supplement the clerical resources of university administrations.

Relationships between health ministries and health training institutions may be particularly sensitive regarding the quality of educational and training programmes. While very useful, reliable information on this topic is difficult to obtain; if a qualitative evaluation is made or arranged for outside the educational institutions without their explicit cooperation, considerable friction may develop. The cost of carrying out a qualitative study is also apt to be high. For these reasons a planning unit should exercise caution in using its own resources to study quality. Wherever possible, it should encourage the educational institutions themselves or other appropriate bodies to carry out such work in coordination with other elements of the manpower planning system.
The main categories of information required are:

(1) Student enrolment. Student enrolments should be obtained by year of study (i.e., first, second, etc.) or in some schools by semester of study, and by sex. To the extent possible all schools within each manpower category should use common criteria for defining a student and should record enrolments at approximately the same time of the academic year. In some countries enrolment figures fluctuate widely during the year—particularly for the entering class—owing to high rates of attrition, and they can be very misleading if different criteria are used for the classification of part-time, inactive, and repeating students. The planned capacity of each class should be noted even though actual enrolments may differ substantially.3

(2) Applicants for admission. First, the total number of persons applying for admission should be assessed (corrected for multiple applications by the same individual). In some countries the total may require correction to take into account the estimated number of applicants considered to have relatively little interest in the profession they are applying for. This is particularly apt to occur where students are able to apply for admission to different professional schools, sometimes with the requirement that they indicate their choices in descending order of preference. In such cases student preference for a given profession may be so low as to distort the significance of the number of registered applicants.

Second, the number of applicants judged to have the minimum acceptable qualifications for training should be estimated. Applicants without such qualifications should not be regarded as potentially available to expand enrolments should this be found necessary.

Finally, projections should be made of the number of persons with the requisite pre-admission qualifications likely to become available in future years, and of the proportion who might be attracted to the health occupations under consideration. Regarding this last point, projection of the potential future supply of applicants is only necessary where there is either (1) an existing or incipient shortage or qualified applicants or (2) a major expansion of the manpower category under consideration being contemplated. Ministry of education data on enrolment trends, secondary school graduates, and continuation rates from secondary school to university and ministry of labour estimates of female labour force participation rates will help in making this assessment.

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(3) Student losses. Student attrition may be substantial in many
countries, up to 75% or more, and loss rates should be calculated in order
to convert student entrants into graduates. Deficient registration stat-
istics, transfers from one school to another, different criteria for calculating
enrolments, delayed graduation owing to leave of absence, repetition of
the academic year, or failure to complete on schedule or ever 1 a required
thesis, all complicate the estimation of student attrition. If schools cannot
provide reliable estimates directly, estimates may be made by the time-
consuming method of checking over a few years, name by name, what
each entering student has done, or comparing cohorts of new entering
students (excluding repeaters and student transfers from or to other schools) 2
with those graduating the requisite number of years later.

(4) Teaching personnel. The number of faculty positions budgeted
for, filled, and considered necessary or desirable for the planned enrolment
should be determined and converted into full-time equivalents to permit
the calculation of faculty/student ratios and to facilitate inter-school com-
parisons and the projection of requirements. 8 Correction factors may
need to be applied to the clinical staff to reduce their total contributed
time to the proportion corresponding to their actual teaching responsi-
bilities, since otherwise the same time may be counted twice in regard to
teaching and to providing services. The planner may want to make a
very approximate non-quantitative assessment of the competence of the
faculty and of the availability of qualified staff if additional teaching per-
sonnel are likely to be required. 4 Detailed evaluations of this type are
apt to be extremely difficult and to be regarded by the persons involved
as a threat.

(5) Costs of training. Information on this aspect of manpower pro-
duction is especially useful both for anticipating training expenditure and

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1 In some countries it may not be possible to assume that all graduates enter the health labour force, or
even that those who do enter it do so without delay. For example, recent survey projections of French
physicians assuming 7%, 7.6%, and 20% rates of non-utilization of medical diplomas have led to substantial
differences in the estimated availability of medical manpower (Hos-Dang-Doi, S. Le corps médical
are further complicated by delayed entry into the labour force. According to studies by Hos-Dang-Doi
and others, only 37% of French graduate physicians enter the labour force the year they complete their
theses, 23% enter it one year later, and 20%, 9%, 3% and 4% enter it in each of the four succeeding years.
(Hos-Dang-Doi, S. Nouvelle analyse de l'intervalle pré-professionnelle. Cahiers de Sociologie et

8 The proportion of repeating students can reach impressive figures in some schools, as can the proportion
of students transferring in or out of the school. If these percentages remain fairly constant from year to
year they introduce little significant error into the calculation of the student attrition rate. However, if the
repetition or transfer rate changes substantially, the planner will have to assess the ways in which the changes
may distort the student attrition rate, a distortion that if ignored could lead to a substantial error in the
projection of new graduates.

4 A detailed study of the medical teaching faculty was conducted as part of the national health man-
power study in Sri Lanka. Detailed analyses were made of its characteristics, the different teaching methods
used, and the time spent in clinical practice, teaching, and non-medical undergraduate programmes. Staff
student ratios were also developed for the whole academic staff as well as for permanent and temporary
staff.

4 For a detailed study of faculty characteristics in the health manpower field, see: Hermon, R. &
Sharkey, N. Israel's nursing educators in the diploma schools of nursing: selected demographic and
for helping schools to make efficient use of their resources. For technical and auxiliary-level training schools it may be relatively simple to obtain annual expenditure figures and relate them either to the students enrolled or to the graduates. The situation of the professional schools can be considerably more complex if service and research are mingled with training functions. For example, how should the planner allocate expenditure on staff with joint service and teaching responsibilities or separate the costs of internship and residency training from the overall medical school budget, and if this is done what portion should be allocate to training and what to research? The complex methodologies that have been used are described in a report published in 1974; the remainder of this section lists suggestions the planner may find useful. These are:

- To develop a series of annual expenditures for each type of school going back for at least five but preferably for ten years, rather than to attempt to draw conclusions from one or several recent estimates. Identifying expenditure trends is as important as determining current educational costs.

- To base estimates on actual expenditure if at all possible. Budget estimates are usually more readily available, but often prove to be quite wide of the actual expenditure.

- When estimating current expenditure, to compare budgeted with actual expenditure in past years and from this to develop a correction factor that can be used to revise current budgets up or down. In this way the planner minimizes the risk of his series of expenditures being distorted by the actual expenditure of past years and the budgeted expenditure for recent years.

- To maintain consistency in the way the various cost components are handled. For example, if field training costs borne by rural health centres are excluded from the cost analysis of one school for medical assistants, similar costs for other schools should likewise be excluded, or at least excluded if comparisons are to be made.

- When comparing costs between institutions or interpreting trends, to take into account possible distortions resulting from fluctuations in enrolments or school outputs. For example, cost comparisons between an established nursing school and one not yet built up to its full capacity are likely to reflect unfavourably on the latter.

- To employ the "cost per graduate" rather than the "cost per student year", though the latter also can be of use. In an institution with a rela-
tively stable output the easiest method is to divide expenditure in a given year by the number of graduates in the same year. A more accurate but probably not justified approach is to multiply the number of graduates in each year by the student-year cost estimates for each of the two, three, or more preceding years.

- When using estimates of student-year costs to calculate the cost per graduate, to correct for factors such as attrition and repeated years so as to avoid errors of underestimation. For example, if only 50% of those entering as students graduate, the student-year cost calculated on the basis of the entire first year’s enrolment would understate by half the cost per graduate.

- To take into consideration certain expenses in kind or contributed if they represent a substantial part of the costs.

- Given the complexity of estimating true costs, to concentrate on major cost items, exclude other costs or develop an approximate inflation factor (e.g. 15%), and use the derived estimates more for identifying trends and approximate levels than for a precise analysis of education costs.

- To derive future costs from trend analyses, since budget projections tend to be short-range and, more often than not, based on wishful thinking rather than reality.

(6) Teaching facilities. The adequacy of the existing physical equipment should be judged in the light of present and postulated future enrolments and special constraints on expansion noted (e.g. laboratory facilities, teaching hospitals and health centres, dormitories, classrooms).¹

(7) Potential curricular changes. Detailed curricular planning is the responsibility of the educational institutions, but manpower planners need to know if major changes are contemplated that could affect admission requirements, the length of training, training resource requirements, or the dropout rate; they may indeed play an active role in promoting, negotiating, or facilitating such changes. In countries where planning is seen as a more active function (and where the public sector exerts considerable control over both the health and the education systems), the planner may provide the educational institutions with detailed task descriptions of the kinds and amounts of skills that will be needed by the health system in future years.

(8) Foreign graduates. In some countries there is a substantial influx of foreign graduates into the health professions—either their own nationals

¹ The Sri Lanka subsample of medical education included a detailed account of the facilities and equipment of the two medical schools in the country, including the general building capacity, teaching and laboratory equipment, library space, the books, and the community facilities utilized in teaching. (See: Ministry of Health, Republic of Sri Lanka, Health Planning and Programming Division. Interim report of sub-study on medical education. Colombo, National Health Manpower Study, 1975, p. 86-96.)
who study abroad because of insufficient training capacity at home or immigrating foreign nationals. Local training institutions may be a source of statistics on this influx of foreign graduates if they are responsible for the validation of foreign degrees. Alternatively, a government agency or professional society may keep a central registry of foreign-trained professionals. If the influx of nationals with foreign degrees is substantial, a special survey of the principal foreign institutions training such nationals may be necessary in order to project future supply increments from this source.¹

(9) Potential expansion of school capacity. The option of increasing the supply by establishing new educational institutions is always available to the planner. In many cases, however, it is both quicker and more economical to expand the existing capacity than to create new schools, and this option should be given serious consideration. School authorities can be questioned about the obstacles to increasing the production of graduates, including those involving capital investment (e.g. the lack of laboratory space, classrooms, or dormitories) and those involving non-capital investment (e.g. the lack of qualified applicants or staff). Estimates can then be derived of the amount by which enrolments would increase if specified constraints were eliminated. Finally, the approximate cost of eliminating the constraints can be calculated and the effect on the production of graduates estimated.

Projection of numbers of new graduates. The easiest method of projecting the number of new graduates, valid only if such variables as enrolment at entry, student loss rates, and the duration of studies have been stable in the past, is to assume a continuation of the annual output of graduates and not to work with student enrolments and other pregraduation factors. In many developing countries, however, the educational system is undergoing such rapid change that this is not possible. Moreover, the planner is interested not only in knowing the likely number of graduates under foreseeable circumstances but also in exploring the effect of different assumptions about attrition and student enrolments on the educational output. Table 9 shows how educational enrolments, student attrition, and postgraduation losses can be combined so that the planner can quickly convert a desired manpower target into the class enrolment needed in earlier years to achieve that target, and vice versa. Differing assumptions about student attrition and the year(s) in which changes in the enrolment are introduced can readily be taken into account.

¹ A survey was conducted by the Health Sector Planning Office in Peru to determine the number of Peruvian students studying medicine abroad and the number likely to return to Peru following graduation. Questionnaires were sent to 35 schools accredited to have Peruvian students and, from the 21 replies received, it was estimated that slightly over half would ultimately graduate and return out of a total of 711 foreign-trained Peruvians during the 1964–73 decade (Kasse, I. L., Health manpower in Peru: a case study in planning. Baltimore, John Hopkins Press, 1980, pp. 119–120, 276–277).
## Table 9. Working Table to Estimate the Change in the Supply of Nurses as a Function of Changes in the Enrolment of Nursing Students at Entry (Hypothetical Values)

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<td>Supply in indicated year assuming increase of 100</td>
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<td>If the class entering is increased by 100 and this increase is maintained annually thereafter, the supply of active nurses will be 77 in 3 years, 81 in 4 years, 85 in 5 years, 89 in 6 years, 93 in 7 years, and so on. If the class is increased by some fraction or multiple of 100, the relevant supply is the same fraction or multiple of the above numbers.</td>
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* Enrolments are estimated for the early part of the academic year, e.g., 100 in the first year, 85 in the second year, and 81 in the third year, with a graduating class of 80, assuming a 20% loss during the three-year curriculum. Supply estimates are made for several months following the usual month of graduation. The rate of attrition assumes that of the nurses who graduate, 95% will be working several months later and 93% one year later, and in the second, third, and subsequent years the percentages remaining actively employed will be 90, 88, 86, 84, 82, 80, 78, 76, 74, 72, 70, 68, 66, 64, 62, and 60 (in the thirteenth year after graduation), following an employment-retention curve similar to but higher than the one observed for Turkish nurses given in Fig. 8.
Supply projections and precautions

At this point the planner assembles his data to develop supply projections of three types: (1) the supply at a future time of persons qualified and physically able to work in the health sector; (2) the number of such persons likely to be actually employed in the sector, given its current and foreseeable capacity to absorb health manpower; and (3) the extent to which the supply can be increased both with and without creating new educational institutions. Ideally the second projection will not be significantly less than the first, since otherwise qualified health workers will either not be able to find employment in their chosen profession or not be interested in accepting the jobs available. If the discrepancy between these two projections is significant, policies relating to manpower requirements can help to reduce the gap.

The third projection takes into account the possible effect on the supply of policies to increase the productivity of the existing educational institutions (through increased enrolment, decreased attrition, shortened curricula, etc.) or to increase their number. It will become useful later if comparison of the supply and requirements projections suggests the need for further expansion in the manpower supply.

For most long-range planning 20-year projections at five-year intervals are adequate. Adjustments may be made to accommodate specific target years such as the end of a government administration or the end of the decade. Detailed programming may require annual projections for at least the first few years of the planning period, and the working tables used in developing projections should be preserved to facilitate recalculation of the original projections to meet emerging needs.

This chapter has paid little attention to the important question of manpower qualifications and performance, far more complex and difficult to measure, which is considered chiefly in Chapters 5 and 6. Nor has it paid much attention to political, economic, social, attitudinal, cultural, and other factors (discussed in Chapters 1, 2, 11 and 12), which are likely to have a profound influence on policy decisions even though they may not enter explicitly into the numerical analysis. The planner must there-

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1 For detailed information on this and related topics see CHEWIS, J. D. Methodologies of educational planning for developing countries. Paris, UNESCO International Institute for Educational Planning, 1969, Vol. 1 and 2.

2 In his article on the future supply of physicians in Kenya, Wheeler (see footnote to page 109) noted several factors that might seriously limit the accuracy of his projections. These include: (a) the projections make no provision for the inevitable increase in physicians engaged in teaching, research, and administration, which will cut directly into the number available for direct patient care; (b) the projections do not allow for a "brain drain" of Kenyan doctors; (c) the projections do not consider loss owing to increased time spent in postgraduate training for physicians; (d) the number entering private practice (thus not available to serve the majority of the population, who live in rural areas) is likely to be larger than anticipated, and (e) the projections assume that the medical school will operate at capacity, which may not occur for some time owing to a shortage of qualified candidates from the secondary schools.
fore be guided throughout the data collection and analysis phases by a strong sense of what information will be relevant, comprehensible, and convincing. To collect supply data according to a recommended international format without adapting it to the local situation is to risk ending up with a plan that will never be put into action.

SUMMARY

This chapter reviews the basic methods for characterizing the supply of manpower and making projections for the future. Criteria are established for deciding which manpower categories to include in a supply assessment and what information to collect. Emphasis is placed on ensuring that the information collected has a clear bearing on decision-making.

Considerable attention is given to the methods used to collect information on supply. The non-response rate must be low and comprehensiveness and accuracy should be sought rather than breadth of coverage. The benefits are stressed of obtaining relatively detailed information on a sample of respondents rather than superficial and often incomplete information on all members of a health manpower category.

Several methods of estimating manpower losses are described and their advantages and limitations. For most situations the cohort method, in which the attrition rate over time is calculated for various cohorts of graduates, will provide the best basis for estimating future manpower losses. Where data limitations do not permit the determination of attrition rates of professions, approximations based on the experience of other countries can be made.

To project future increments in the supply the planner needs to estimate the likely output of the educational institutions, intra-school and extra-school attrition, and immigration of health personnel from abroad. He also needs to consider the feasibility of modifying intra-school and extra-school variables so as to increase the output of new graduates should this be required to satisfy the projected requirements for manpower.

The chapter concludes by presenting a method of compiling supply data that allows the planner to meet rapidly any desired manpower supply target by several alternative ways that involve differing assumptions regarding student enrolments, the timing of enrolment decisions, and intra-school as well as postgraduation loss rates. By using such factor projection tables planners, educators, and health programme administrators can facilitate the formulation of supply policies.
Productivity
Timothy D. Baker

An understanding of productivity is vital for health manpower planners. Throughout the world, governments and private citizens are demanding a more productive and less expensive use of health manpower to control spiralling health care costs. Furthermore, corrective action to decrease health manpower shortages by training new workers is long-term in nature. If the productivity of doctors can be increased by 10% in two years, it is not only cheaper, but also quicker than waiting five years for a 10% increase in graduates from medical school expansion.

This chapter reviews concepts, methods of measurement, and ways in which manpower productivity can be increased. Much of the research and experimentation on the productivity of health manpower has been carried out in developed countries. Rafferty has written an excellent review of the subject. The methods and concepts he presents in his monograph can be used directly by health manpower planners in most developed countries and adapted for use in the less developed world. A recent important economic analysis by Reinhardt will be useful to readers familiar with basic economics.

Concepts and Definitions

Productivity may be defined as output per unit of input (e.g. health services per unit of professional time or per unit of cost). It is a function of the efficiency of providing health services and, indirectly, of their utilization. The relation that exists between the supply of health workers and the demand for their services will be determined in large part by their productivity, as shown in Fig. 9. In this diagram the imbalance indicates that the demand for services exceeds the supply of health workers to provide services. The balance could be restored by: (1) decreasing the demand (usually unfeasible or undesirable); (2) increasing the supply of health

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1 Professor, Department of International Health, Johns Hopkins University School of Hygiene and Public Health, Baltimore, MD, USA.
manpower; or (3) increasing the productivity of existing supply. This last alternative, which would move the fulcrum "productivity" to the right in Fig. 9, is this chapter's topic. Health manpower productivity may be increased by the more efficient use of manpower, equipment and supplies, facilities, administrative techniques, and technology.

The concepts of productivity and health service utilization are linked and at times used interchangeably. Productivity increases must be accompanied by parallel increases in the use of health services. Utilization depends on consumer perceptions and preferences, accessibility, and cost. In effect, utilization is expressed demand.

An example will clarify the difference between productivity and utilization. Assume that two doctors are working full-time in a health centre receiving 100 visits from patients per day. If they reorganize their working patterns so that they could deal with 125 visits per day at the same cost, their productivity could be increased by 25%. If, however, the people being served by the centre—whether for reasons of distance, lack of confidence in the centre staff, or whatever—do not increase their utilization of the services to match the potential increase in productivity, the facility becomes underutilized (in relation to its potential) and the actual staff productivity remains unchanged.

The technical feasibility of increasing productivity does not necessarily imply the economic feasibility of doing so. It is economically feasible to increase productivity only when the monetary value of the increased output exceeds the monetary cost of the increased input. However, since outputs and inputs are often expressed in different units, it may be difficult in some situations to determine whether the resultant increase in output justifies the increase in input.
Approaches to Productivity Measurement

Units of measurement

Monetary units are useful in comparing health inputs (worker time and support) and outputs (health services). Only money can reduce to a common value all the various component parts of a productivity determination. This approach is, however, frequently not feasible. In some cases problems are encountered when planners attempt to allocate the costs of support inputs such as buildings, major items of equipment, and administrative personnel among discrete outputs such as inpatient, outpatient, and community services. For the most part, though, these problems can be resolved within an acceptable range of accuracy. Accurate estimation of the monetary value of outputs is less feasible. The value of lives saved and increased productivity of labour from lower morbidity is very difficult to measure and still more difficult to link causally to different health services. Furthermore, it is extremely difficult to measure the substantial non-monetary benefits of freedom from pain and improved well-being.

Other units to measure input include the time input of a health worker (e.g. physician-hours or nurse-days). Workers may also be combined to give units such as a “health-team-day”. In some situations these units are quite satisfactory and can be reliably estimated, while in others difficulties are encountered in linking diverse inputs with a single unit of measurement such as a physician-hour and linking multiple inputs of physician-hours or nurse-hours with outputs such as hospital-days and discharges.

Changes in health status would be the ideal unit of measurement for outputs of the health sector. Since it is rarely possible to link improved health with specific health inputs, proxy measures such as number of services produced or income generated have been substituted. Even with such units of measurement, however, productivity comparisons between different facilities at the same time or the same facility at different times are complicated by variations in disease severity, case “mix”, quality of care, fee schedules, technology used, and the like. In order to minimize these difficulties, planners can disaggregate their analyses so that outputs are relatively homogeneous (e.g. X-rays taken per radiology technician or operations performed per surgeon). This microanalytical approach is time-consuming and may divert attention from larger issues of productivity.

An alternative approach is to look at large units of production such as a health centre or hospital and focus on major programmatic activities (e.g. maternal and child care or sanitation). This aggregated approach combines multiple dissimilar inputs and requires a mechanism to make cross-sectional or secular comparisons.
To facilitate the conversion of dissimilar services into common units of measure several concepts are useful: (1) full-time equivalents (FTE), (2) relative value units (RVU) and (3) identifiable medical procedures (IMP). The concept of full-time equivalents (FTE), described in Chapter 4, expresses in units of full-time personnel the aggregate time contribution of both full-time and part-time personnel. The number of hours, days, or weeks of work assumed for an FTE health worker may be defined arbitrarily on the basis of some standard for full-time employment or derived empirically by observation of the actual amount of time spent on the activity under consideration. For example, if a standard full-time working week for nurses is 40 hours, then two FTE nurses are the equivalent of four half-time and eight quarter-time nurses. Use of the FTE concept makes it possible to compare the outputs of health teams or facilities using different mixes of full-time and part-time personnel or having different standards regarding full-time employment.

Relative value units facilitate comparison of the relative amount of work necessary to produce one health service output as against another. For example, if a routine follow-up visit to a clinic is rated as one RVU, then the more time-consuming initial visit may be two RVU, an appendectomy 50 RVU, and a gastrectomy 200 RVU. Such scales are usually set by experts, one example being the frequency used RVU scale prepared by the California Medical Association.1 The RVU refers more to the input cost of a service than to its absolute value to patients or society. Although RVUs are based on inputs, they may be used to compare different outputs. By way of illustration and based on the above values, the output of a hospital performing five appendectomies per day may be roughly equated with the output of two health centres seeing a total of 50 new patients and 150 follow-up visits, i.e., \(5 \times 50 = (2 \times 50) + 150\).

Although less well known, the IMP or identifiable medical procedure gives some promise of improving the ability to make comparisons among units producing heterogeneous services. As developed by Kovner and later used by the Michigan State Medical Society,2 IMPs provide descriptions of the activities of medical personnel. These are divided into three phases concerned with patient examination, information retrieval, and patient-practitioner interaction leading to diagnosis and eventual treatment. Falling into one or more of these categories are various services—special

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diagnostic, radiological, laboratory, therapeutic, and surgical. These IMP units comprise the input of the medical and supporting staff.

The above and other techniques for combining dissimilar inputs and outputs into common units have been used in a variety of situations. In the case of ambulatory care, services are generally expressed in terms of the "visit", qualified as to the type of provider (such as a physician or dentist). But visits are far from homogeneous units and may be subclassified by place—home, consulting-room, hospital, outpatient department, dispensary, or health centre—or by intensity—new patient or routine follow-up. The RVU for procedures carried out in a visit may vary sixfold according to California Medical Association standards, ranging from telephone contact to a complete history and physical examination for a new patient. Consulting-room visits are usually linked with diagnostic procedures that use a different set of units of productivity. Furthermore, diagnostic tests may be carried out in a separate location by special laboratory personnel or alternatively be considered part of the productivity of clinic staff.

Statistics on the number of visits by patients to physicians or other providers in ambulatory care give striking evidence of the great variability in productivity and suggest the magnitude of potential productivity increases. According to Popov\(^1\) the standard for polyclinic visits in the USSR is a mode of five patients per hour (ranging from 9 per hour for surgery visits to 1.5 per hour for speech therapy).

In developing countries physician productivity varies greatly. In a few facilities the number of patients attending daily per physician can exceed several hundred, while on a national basis, according to the findings of recent manpower and medical care studies, it has varied from a high of 40 in China (Province of Taiwan), down through 16-18 in Peru and Chile and 13 in Colombia, to less than 8 in Turkey.

The gross disparities in numbers of patients seen in different locations suggest how differently doctors work. Larger numbers of patients cannot, however, be directly correlated with better end-results since quality declines as the numbers reach a certain threshold. Still, for the financially pressed health services of developing countries, it is an obvious waste to employ physicians who see only a few patients per day.

The measurement of hospital productivity is far more complex than it is for ambulatory care. Because of the greater variety of resources used in the production of hospital services, almost all studies of hospital productivity have used cost as the input measure. For outputs, most

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investigators have used the patient-day as the unit of measurement, though patient discharges (or alternatively, admissions) are probably a far more useful measure of effective productivity. Whatever the choice of unit, the planner needs to include both the imputed cost of hospitalization per day or per discharge as well as the attributed cost for, for example, radiology, the blood bank, and the laboratory. The cost for services charged by these units may be an imperfect reflection of their productivity but is likely to provide a reasonable basis for calculation. Donabedian provides an excellent review of the methodological problems and findings of the major hospital productivity studies conducted in recent years.

Quality of Services

Productivity measurement must take into account some minimum standard of quality of the health care provided. Without such a standard, administrators could increase productivity simply by delegating the performance of many health care functions to low-cost, inadequately qualified manpower, with increased morbidity and mortality as a consequence. Measuring the quality of health services is one of the most difficult tasks that confronts the health planner. He should be familiar with the underlying concepts and major approaches to the measurement of quality that are in use.

(1) End-results. The ability to link health outcomes with the provision of specific kinds and quality levels of health services would provide the planner with the best possible means of allocating resources rationally among different health care activities and programs. Unfortunately this approach has proved to be the most difficult one to apply in practice because of the multiple non-health variables that impinge on the end-results of health services.

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1. The imputed costs of a hospital bed-day could be calculated by dividing the total annual capital, maintenance, equipment, food service, laundry, utilities, and general administrative costs of the hospital by the number of patient days in the hospital. The imputed cost would then have to be added to the imputed costs attributable to a day's care produced by one or another specific unit. For example, the cost of a bed-day in the surgical ward would include the imputed costs of the ward, the ward nursing staff, plus all the costs specifically attributable to the surgical service such as surgical and anesthesia personnel, operating suites, surgical supplies and equipment, and whatever portions of the costs of the laboratory, radiology, blood bank and other services relate to the care of surgical patients.


(2) Expert judgement. Observation of the delivery of health services or the review of records by expert practitioners is easier to implement than end-result analysis, though it also presents both conceptual and methodological problems. These include: (a) unsubstantiated relationships between the expert’s definition of high-quality care and improved health status; (b) experts proposing service standards not attainable in the field; and (c) the unavailability of sufficient information to carry out such reviews. With regard to this last point it is interesting to note that in the Colombian health manpower study it was found that, of the physicians surveyed, only 9% kept complete clinical records and 35% kept no records at all.  

(3) Peer review. This method evaluates the services provided by an institution or practitioner by peer reference groups. It has the potential advantages of easy application and realism in that the standards of practice used have been demonstrated to be attainable. It has the disadvantages that it discourages innovation and that health professionals are reluctant to criticize co-workers.  

(4) Patient satisfaction, the extent to which a patient is pleased with health services, is an important, though at times misleading, measure of quality. In practice, opportunities for repeated and informed evaluations of care by individual patients are usually limited, and patient satisfaction is often based on factors that are unlikely to influence end-results.  

(5) Quality indicators. Tracer conditions or services that indicate overall quality and are easily measured provide a promising tool for evaluating quality. Tracer conditions are disease entities, such as middle ear infection, in which the preferred course of treatment is both generally accepted and has important end-results. By reviewing the records one can see if a physician has handled the tracer condition satisfactorily. If so, it is assumed that he will handle other conditions satisfactorily.

Methods of Increasing Productivity

The productivity of health care resources can be increased by increasing the quantity, appropriateness, quality, and coverage of health services. This section outlines the principal methods that have been used to achieve increases and comments on their likely effects. Although described

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separately, each method overlaps substantially with others, and in practice the planner will usually want to use a combination of methods.

**Technical advances**

Improved technology can either increase or decrease manpower productivity. Specialized equipment such as the autotechnician, the multiple channel blood chemistry analyser, the automatic radiographic film processor, and the automated analyser of electrocardiograms has increased manpower productivity by a substantial margin. The use of the high-speed dental drill has increased dentist productivity by reducing the average time per procedure by an estimated 15%. In countries where labour costs are low and the skills required to operate and maintain complex equipment are scarce, the premature introduction of such labour-saving devices may not be practical.

The introduction of open-heart surgery techniques, although it has prolonged the lives of a few patients, has probably decreased the aggregate productivity per surgeon-year or per hospital dollar expended. Similarly, intensive care units, although they may save some lives previously lost, decrease productivity as measured in terms of cost per bed-day.

Despite the great contribution that improved medical technology has made to productivity, many countries underspend in introducing it, while others waste scarce resources on the importation of advanced techniques or equipment that are inappropriate to local conditions or beyond their capacity to use effectively. While the high cost of developing medical technology argues in favour of leaving it to be done primarily by the industrially advanced countries, the cost of monitoring new developments and adopting those in accord with local needs and resources is well within the means of most countries.

**Delegation of tasks**

Health manpower planners will find that the delegation of tasks is one of the most effective ways of increasing productivity, even though delegation means that a substantial amount of time will be required to provide on-the-job training and planned supervision. If the use of auxiliary personnel, either by substitution or addition, can increase the production of services in a given situation by a greater percentage than resource inputs will, then the overall productivity is improved.

One of the best documented examples of increasing productivity through delegation is in the field of dentistry. Reports1 from Australia, Canada,

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New Zealand, Scotland, and the United States demonstrate the value of delegating responsibility to assistants. The information from the United States is particularly striking; a survey in 1968 showed that the number of patients seen annually by the dentist increased progressively with the addition of auxiliary personnel until it was 239% higher by the time the dentist employed three full-time auxiliaries.

Similar studies on the relation between physician productivity and the number of assistants employed are more difficult to interpret, largely because of the greater variety of medical practice as compared with dental practice. In some studies the total medical practice income was positively correlated with the use of assistants but the number of patients attended per physician showed little change, presumably owing to a reduction in the number of hours worked by physicians in practices utilizing many assistants. In other studies the relatively greater increase in practice income than in number of patients attended was attributed to a shift in the mix of services provided, those practices with a higher number of assistants providing relatively more low-cost highly priced services than practices with few assistants. Despite the sometimes confusing results, however, most studies show a positive correlation between the use of non-medical support personnel and increases in physician productivity.

In the nursing profession considerable progress has been made in some countries in delegating authority. For example, during the period 1950-68 the percentage of middle-level nurses in one country dropped from 35% to 24%, with a corresponding increase in the percentage of aides. In addition to the delegation of tasks from registered nurses to aides, college-educated nurses and nurse practitioners are assuming responsibility for tasks formerly performed by physicians. In many countries, unfortunately, the shortage of nursing personnel in relation to doctors makes an appropriate mix of tasks for maximum productivity unattainable in the foreseeable future.

A number of studies have shown that lower-level practitioners can be trained to carry out highly specialized tasks with an efficiency comparable with that of physicians. The USSR health system has made extensive use of feldshers to increase productivity and thereby extend health care.1

Perhaps the most impressive current example of the delegation of tasks is the Chinese “barefoot” doctor. Over a million of these health workers, who have had several months’ training and receive supplementary periodic

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refresher training, assume many medical functions in the rural areas of China. Despite the success of the barefoot doctor programme, planners in developing countries need to proceed cautiously in adapting this model to the situation in their own country.1

Task and functional analysis

Task analysis and its more recent variant, functional analysis, which were briefly referred to in Chapter 3, may be useful to health manpower planners seeking to determine which tasks to delegate and the probable effects of such delegation on productivity. Originally developed by a few industries in the early 1900s, task analysis and its subsequent derivations are only now beginning to be applied in the health sector to any significant degree. An early review of the literature in this field was made by Chenzoff.2

For those concerned with the use of health manpower there are obvious advantages in identifying tasks that require only technical training and skills or, on the other hand, require professional education and judgement. A good example of a task that was appropriately transferred to less costly personnel without loss of quality of output is intravenous fluid administration. The task of inserting a needle or cannula and administering the fluid is a technical one while decisions relating to the type and amount of the fluid are professional, calling for clinical judgement. Separating out the different task components has led to the administration of fluids by technical personnel, while professionals make decisions as to amounts and types.

Task analysis has been carried out in many countries. Russian health planners have been particularly active.3,4 Nourith Ben Dev5 carried out an extensive study of nursing activity tasks in Israel using methods that should be of value for planners. Other references are given in the section on nursing in Chapter 9. WHO studies by M. Reid on hospital nurses in Thailand and auxiliary nurse midwives in India4 are of both substantive and methodological interest. The work of paediatric nurse practitioners in the United States as compared with regular nurses and

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5 Ben Dev, N. Nursing activities study. Tel Aviv, Ministry of Health of Israel, 1966.
6 Reid, M. A study of the activities of auxiliary nurse midwives in Haryana, Punjab and Gujrat States. New Delhi, WHO Regional Office for South-East Asia, 1969.
Several family planning programmes have used task analysis as a planning and management tool to increase productivity. In India, a detailed training programme for family planning personnel was developed and implemented using task analysis to describe in detail the jobs to be accomplished and the skills necessary to perform them.

A methodology for the functional analysis of health needs and services was developed in studies in China (Province of Taiwan), India and Turkey by researchers at the Johns Hopkins University. It was designed to improve the planning linkage between health needs, services, and resources. The technique relates community household survey data on health needs to resources and to health worker activities as determined by work sampling of services provided by health centres and health workers. Alternatives are examined for reorganizing health services and the implications of reorganization are determined in terms of revised job descriptions and training objectives. Reine, Taylor, Parker, and others have described practical applications of the technique.

Organizational changes

Organizational changes can have an important effect on productivity. A study of the medical service in a large teaching hospital in Santiago, Chile, (Personal communication from Dr. B. Juricic, Ministry of Public Health, Chile) provides a dramatic example of such gains. The average patient stay was 22 days (7 days for diagnosis, 10 for treatment, and 5 for discharge). The long diagnostic phase was mainly due to delays in providing outpatient diagnostic services, which necessitated admission for diagnostic tests. The five days for discharge was due primarily to difficulties in arranging for family members to pick up the patient. Review and discussion of these findings led staff to make major changes in the medical services. Two of the three wards were closed and staff reallocated.

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2 The experience of investigators working in the Louisiana, USA, family planning programme is especially relevant to those interested in applying task analysis to the health field. In the early 1970s they developed task statements covering what was to be done and how, what were the prerequisite knowledge and skills, and what were the expected performance standards for more than 240 tasks expected of family planning workers. The publications arising from this experience provide an excellent introduction to how task analysis can be applied, its replication, and its merits and limitations as a tool for manpower planning, management, and evaluation. See especially: Family Health Foundation, *International Services Division, New Orleans, 1973* (Western Regional Training Institute, Family Health Foundation, Inc.).


to the outpatient clinic and to improving follow-up and home services. Once the new organizational pattern had become stabilized, the average patient stay dropped 40% to 13 days (2 days for diagnosis, 10 for treatment, and 1 for discharge). Although the service was able to attend to roughly the same number of patients (a significant number on an outpatient basis only) with little more than one-third of the previous number of beds, the total cost to the hospital and the Chilean economy as a whole was greatly reduced. The economies were attributable in part to the use of less costly outpatient facilities but even more to the reduced duration of the sickness benefits paid by the government insurance system to employed individuals and to less time lost from work.

Many studies have been carried out in the United States and to a lesser extent in other countries on the productivity of physicians organized into group practice. As noted earlier, most productivity gains appear to be attributable to the greater use made of support personnel, but in the studies Donabedian reviewed there is evidence that group practice is also associated with other changes that contribute to increased productivity.

Donabedian reviewed the extensive literature on the extent to which the size of a hospital or ambulatory care facility is correlated with productivity. Although such studies are complex and tend to produce equivocal results, his general conclusion was that, other things being equal, productivity tends to rise with the size of the health care facility until a plateau is reached, after which it declines somewhat, presumably because of increased problems of administration, communications, and internal supply. Investigators concerned with such studies experience difficulty in correcting for the different output mixes and presumed quality of services produced by health facilities of differing size, and no consensus yet exists regarding the optimum size range for facilities of given characteristics.

In large health facilities it is often possible to increase productivity both quantitatively and qualitatively through functional specialization. However, the benefits of specialization are not obtained without cost; unless planners and administrators choose appropriate circumstances for specialization, they may find problems developing that negate the potential benefits. These problems include: inadequate attention to the needs of the whole patient; difficulty in shifting resources in response to evolving needs; over-specialization; and distortions in the mix of services provided because of the availability of so much specialized care.

Terms of employment

A number of health systems have sought to determine whether one or another pattern of remuneration would have beneficial effects on manpower productivity, and special incentive schemes are not infrequently devised to pay workers employed in a new high-priority health programme such as malaria control or family planning. Chapter 3 briefly considers the interrelationships between manpower productivity and the method of remuneration, and the interested reader is referred to Glaser's monograph 1 for one of the most comprehensive studies of the effects of different remuneration schemes on physician behaviour.

An obvious way to increase the productivity per health worker is to extend the working week or reduce the amount of time lost from absenteeism, or both. Sometimes the total number of hours worked can remain unchanged but hourly productivity can be increased simply by improving the scheduling of worktime. For example, some countries have found that productivity is increased by eliminating half a working day on Saturday and increasing the number of weekday hours worked by an equivalent amount, presumably because worktime lost in the daily process of starting up and closing down is reduced thereby.

Appropriateness and concentration of services

Good-quality services produced in volume will have little effect on health status if the services are inappropriate for the main health problems. By optimizing the distribution of health resources among different health programmes, the planner can often have a major impact on productivity.

Decisions on manpower resource allocation are seldom simple, since many health problems cannot be prevented from arising nor are there obviously superior methods of dealing with them. The use of economic and manpower models in accordance with professional judgement may help to identify the programmes that produce the greatest benefits without an increase in costs.

The different outputs that can be obtained from a given input are shown in Table 10, which is based on Peruvian standards and salary levels. The table shows that almost 6000 immunizations can be carried out for the same expenditure as is required for one long-stay hospitalization. The degree of substitutability of one service for another varies greatly according to the health situation. Up to a certain point good ambulatory care decreases the need for hospitalization. Once this point is reached additional ambulatory care has little effect on the hospitalization rate.

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TABLE 10. ESTIMATED SERVICES PRODUCED ANNUALLY
BY SELECTED HEALTH RESOURCES AND SERVICES PRODUCED
FOR THE COST OF ONE LONG-STAY HOSPITALIZATION *

<table>
<thead>
<tr>
<th>Health resource</th>
<th>Services per year</th>
<th>Services for same cost as one long-stay hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-stay hospital bed</td>
<td>1.5 patients treated</td>
<td>1</td>
</tr>
<tr>
<td>Short-stay hospital bed</td>
<td>27 patients treated</td>
<td>9.6</td>
</tr>
<tr>
<td>Doctor in clinic</td>
<td>850 visits</td>
<td>495</td>
</tr>
<tr>
<td>Dental in clinic</td>
<td>4500 visits</td>
<td>700</td>
</tr>
<tr>
<td>Sanitary inspector</td>
<td>2550 inspections</td>
<td>1009</td>
</tr>
<tr>
<td>Immunizer</td>
<td>9150 immunizations</td>
<td>5530</td>
</tr>
</tbody>
</table>

* Based on data provided by T. L. Hull (see Hull, T. L., Health manpower in Peru: a case study in planning. Baltimore, Johns Hopkins Press, 1965). The standards used in this example were developed in 1966.

Small hospitals tend to be medically and economically inefficient, whereas an ambulatory facility with a few doctors and a small auxiliary staff can operate efficiently. Estimates derived from the Peru health manpower study suggest that four health centres could be staffed with two doctors each for roughly the same cost as one 50-bed hospital. In a country where most communities are small and many persons requesting hospital care could be just as well treated in a clinic, the advantage of having four clinics in place of one small hospital seems obvious. Indeed, as a general principle, planners in both the developed and developing countries alike should give priority to completing the basic ambulatory care system structure before filling in gaps in the hospital system.

Equal expenditures on different health care modalities—hospitalization, ambulatory care, preventive services, etc.—not only produce different service outputs, coverages, and health effects but also make different demands on the manpower supply. For example, ambulatory services require proportionately more doctors and technicians but proportionately fewer nurses than inpatient services do. Accordingly, the scarcity of certain types of manpower may slow the rate at which planners and administrators can shift resources from less to more productive health care modalities.

An alternative to improving the appropriateness of health services or programmes is to improve the concentration of health care provided. By concentration is meant the amount of care provided to consumers, the objective being that each person should receive neither less than the minimum number of services necessary to improve his health status nor more than the number required to produce the desired effect. In practice this alternative is frequently neglected, health personnel being either too thinly distributed among the population to have any real impact or
else concentrated on a small segment of the population where the marginal value of the services provided is small. Using his knowledge of the effectiveness of the available medical technology, the planner should verify that the manpower and other resources produce services that are sufficiently concentrated on the main health problems to result in improved health status.

The above discussion has centred on factors that favour the use of one service modality rather than another where a degree of substitutability between them exists. The need to achieve a better distribution and hence a better concentration of services, to allow more frequent patient contact with the health system, and to treat diseases before they incapacitate argues in favour of an emphasis on ambulatory care. In some countries it may also be necessary to give priority to the service modalities that economize scarce resources most.

SUMMARY

This chapter reviews productivity as applied to health manpower—how productivity is defined, methods of measuring it, and ways in which it can be increased. Many planners are understandably hesitant about paying much attention to productivity issues because of their complexity, especially as regards measuring the input and output components of a health care delivery system. Nevertheless, careful attention is essential since even modest increases in productivity throughout the health system are often much more cost-effective than increases in the supply of health workers. Advances in medical technology have had a major impact in recent years on increasing productivity in the industrially advanced countries. In many countries, however, the lack of trained manpower to operate complex equipment, the inappropriate replacement of needed jobs by labour-saving devices, and the tendency for new techniques to draw resources away from less glamorous but more cost-effective preventive and primary care services all point to the limited application of some kinds of advanced technology in the health field. One method that offers great potential for increasing productivity in a wide variety of settings is the delegation of tasks from more to less highly skilled types of manpower. Other important determinants of manpower productivity include the organizational pattern, the way manpower is remunerated, and the appropriateness and concentration of the health services in relation to the main health problems. The planner must seek to maintain a satisfactory balance between quantity and quality so that gains in quantitative productivity are not negated by an excessive decline in quality.
Manpower production: implications for planners

F. M. Katz

A supply of competent health care personnel is a necessary, though obviously not the only, condition for adequate health care. Since the needs reflect the physical, social, and economic conditions prevailing in a given community, they necessarily differ from community to community and so, in turn, must the competences required of health workers.

That this is self-evident does not guarantee that it is put into practice. Indeed, it is common to find the production of manpower to be relevant to the health needs of the past rather than to those of today, let alone those of tomorrow; or relevant perhaps to the needs of communities qualitatively and quantitatively different from those of the community in which the manpower is produced or to those of small sections of the community rather than the population as a whole. Many of the programmes that purport to produce the manpower needed for the health care of the community, if judged by the criteria of relevance to local needs, must be deemed inappropriate. Hence the first and probably the most important principle that ought to guide the production of health manpower is only too frequently not observed in practice. Not only is the process of producing manpower insufficiently geared to local requirements; it is also often far from efficient. Only too frequently it is wasteful of human and physical resources, does not utilize available knowledge of how learning can be optimized, and is not evaluated to ensure that it achieves its objectives.

This chapter outlines certain principles that ought to guide the process of health manpower production and the basic requirements for all manpower production programmes, requirements that need to be met to ensure that those new to the health care field develop the knowledge, skills, and attitudes required of them. In essence, it deals with the problem of how, once the qualitative and quantitative requirements for health manpower have been identified, educational programmes should be planned, implemented, and evaluated.

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The Health Manpower Production Process

Fig. 10 illustrates the interdependence of the three facets of a health manpower process. It draws attention to the reciprocal functions or feedback of each of the three elements in an effective manpower system, so that the analysis of health requirements is seen not only as defining but also as being defined by the production process and manpower utilization. Similarly, each of the other two elements determines and is determined by the other element. Such a reciprocal feedback is an ideal seldom found in practice and is neither planned for nor utilized. There are, however, some noteworthy exceptions which highlight the attention that ought to be given to developing such a system. For example, the new University Centre for Health Sciences of the Ben-Gurion University, Negev, Israel, represents a determined attempt to integrate an education system with a health care system, creating a planned two-way flow of practitioners and educators in which practitioners are involved in the educational process and the faculty and students have from the very beginning been integrally involved in the health care system. At this institution, health service and basic and continuing education are complementary elements of a manpower system.

In this connexion, it must be stressed that basic education and continuing education are interdependent, a principal objective of basic education being to inculcate in the health professional the desire for and ability to continue his education in order to ensure that he is able to meet changing demands and requirements.
The justification for all health manpower planning programmes is the production of a supply of health workers to meet identified needs. This requires, among other things, planning, implementing, and evaluating educational programmes. In carrying this out, health manpower planners and educators—those who plan the actual production process—have joint responsibilities and should coordinate their efforts.

Several phases of an actual educational programme can be distinguished.

(1) **Converting requirements into programme objectives.** The first and essential step in developing a programme is to convert the functional requirements planners have identified into a set of general objectives. These general objectives will list the competencies required of graduates, separate specifications being needed for each category of health worker. The planner must establish priorities for meeting the various requirements and his training objectives should reflect those priorities.

(2) **Selecting appropriate processes.** Once general objectives are specified, the next step is to identify the local conditions that must be considered in selecting appropriate educational components. For instance, it is necessary to ascertain what facilities are already available, what support or obstruction may be expected from existing health workers and the educational system as a whole, and what financial support is available to the programme. With this information it is possible to specify the physical and human resources required to achieve the objectives. In the specifications consideration must be given to conditions known to facilitate learning; these are described below under "The Teaching-Learning Process".

(3) **Specifying institutional objectives.** The general objectives need to be converted into institutional objectives—that is, the necessary minimum competencies graduates should possess.

(4) **Selecting programme participants.** Identifying institutional objectives allows decisions to be made about the characteristics desired for staff, students, and administrators. This will in turn guide the development of appropriate selection processes and staff training programmes.

(5) **Preparing a detailed educational programme.** With the above steps completed, it is now possible to proceed with preparing a detailed programme. This is likely to require a further clarification of objectives, specification in sequential order of the knowledge, skills, and attitudes to be acquired by students, and establishment of the most efficient methods for helping students to learn and for evaluating their educational achievements. Finally, suitable learning materials need to be found or developed.

(6) **Evaluating the results.** In each of the above phases it is necessary to establish an evaluation mechanism permitting informed judgements to be made. Monitoring the conversion of requirements into objectives is likely to indicate the need for identifying and perhaps revising the require-
ments. More generally, evaluation provides essential information for improving the objectives themselves and the process by which the institutional and more specific learning objectives are realized.

The Teaching-Learning Process

In planning an educational programme several essential elements need to be considered: learners, instructors, educational materials, and an institutional organization responsible for planning, implementing, and evaluating the programme. To ensure that each of the elements is optimally related to the programme's objectives, the following essential conditions must be met.

Learners

The following characteristics of learners and learning are now accepted as facilitating the acquisition of knowledge, skills, and attitudes.

(1) Every learner is different from every other learner. This is readily acknowledged, yet in practice is ignored by almost every educational programme. Almost without exception individual differences in personality, level of attainment, learning style, etc. are not considered in educational practice; the decision about what is to be learned and the presentation of the material to be learned usually proceed as if all learners were identical. For example, the most common instructional method, the lecture, would be appropriate only if all the learners listening perceived and reacted to the material presented in the same way.

Moreover, individuals do not all learn at an identical speed. Learning should therefore be individualized to allow each student to develop at his own rate, the learning material being varied according to differences in learning style and the instructor's task being to assist each individual as required.

(2) Learning is an activity. Too often is teaching equated with learning, at least implicitly, the learner being considered as a passive recipient of knowledge. But learning is an activity, and the more actively the learner is engaged the more likely it is that learning, the desired change in his behaviour, will be achieved. Thus, to ensure that he learns effectively, the learner must be actively involved in defining his educational objectives, engaging in problem-solving activities, and assessing his own performance. It is also essential that he should assume responsibility for his own learning, a responsibility that will be thrust upon him once he engages in professional activities or continues his education after graduation.

Consequently, the teaching-learning process ought to engage the learner in self-directed study, provide opportunities for him to define his own
objectives and, perhaps most importantly, maximize the opportunities open to him for continuous application of his new knowledge and skills to solving real problems. Only then will he take responsibility for his own learning.

(3) Learning is enhanced by providing learners with an immediate feedback about their achievements or responses in new situations. An immediate reaction or response to whatever the learner does reinforces correct responses and reduces the likelihood of incorrect responses becoming fixed. For maximum effectiveness such a feedback must be prompt. It may provide positive or negative reinforcement. For example, a child touching a hot stove not only gets an immediate feedback about the appropriateness of this action but also, because the action produces discomfort, it will be attended with negative feelings. An association between a response and a positive effect (rewarded behaviour) is more conducive to learning than a response that evokes negative feelings (punished behaviour), hence positive reinforcements are generally more conducive to learning than negative ones. The essential point, however, is that the learner becomes aware of the appropriateness of his response.

(4) Learning is more likely to occur when the learner is motivated to learn. The relationship between learning and motivation is well known, and teachers have employed many techniques in seeking to motivate their students. The most common rely on extrinsic rewards in competitive situations or on punishment (both physical and mental). Yet the individual can be motivated to make greater efforts by other means, such as being given the opportunity to set his own objectives; by completing a specified task he can achieve the feeling of being able to do things he could not do before. Such intrinsic motivation is not only more conducive to learning but also does not give rise to the undesirable effects of the often used "carrot and stick" approach, which frequently produces a negative attitude to all learning.

Learning frequently requires effort and activity that may not be immediately rewarding, but this is not to say that it is not enjoyable. By carefully organizing learning activities, making them intrinsically interesting and hence enjoyable, and ensuring that they are goal-oriented, motivation can be achieved.

Instructors

The importance of instructors, teachers or, as they are increasingly being considered, "managers of learning" cannot be overemphasized. The instructor is responsible for planning, implementing, and evaluating an educational programme. To do this he needs to understand not only the subject matter but also, equally importantly, educational principles
and processes and the specifics of how to plan, implement, and evaluate an educational programme. In particular, to be effective:

(1) An instructor must have the knowledge and skill necessary for planning an educational programme. Planning an educational programme requires an understanding of how the qualifications to be acquired by graduates can be defined and organized into a sequence of learning objectives. Once these are specified, it is necessary to provide instructional materials suited to the learner's individual capacities in terms of the principles of effective learning described above. Finally, an evaluation procedure must be established by which the instructor can assess the student's attainments, his own performance and, perhaps most importantly, the validity of the objectives of the programme.

This view of the instructor as a guide or manager of learning is in contrast to the common conception of the instructor as a person whose main function is to present his students with information he has digested and organized. Certainly he is required to have an expert knowledge of his subject, not in order to present information but as a resource person to whom students can turn for guidance and help. His role is to assist students to develop an inquiring approach by clarifying their goals, both long-term and short-term, developing their strategy for gaining the required knowledge, and helping them test it out against the realities. It is his function to diagnose weaknesses and help individual students; to generate an educational climate in his class that is conducive to learning; and to provide the learning materials needed for students with different learning styles to attain the required competence in the minimum time. Finally, it is his task to encourage and motivate students, to show them the relationship between learning activities and professional requirements, and to assist each one to develop as a person.

(2) An instructor must provide a model of behaviour with which learners can identify. Instructors, by virtue of their position, status, and role, are models that will influence their students' development. Students observe and often identify with the instructor and the goals that appear to direct his behaviour, and this is reflected in their attitude in, for example, their dealings with patients, their involvement in continuing their own education and research, their willingness to adapt themselves to new conditions, and their acceptance of criticism.

Educational materials and methods

In the last few decades there have been dramatic technological advances in the education field and, more specifically, new resources have been made available for presenting learning materials. Not since the development of the printing press, which permitted the inexpensive reproduction of
accumulated knowledge, have there been such a revolution and such a strengthening of the quality and quantity of resources available to assist the learning process. Examples are quick, cheap reproduction facilities, microfilm, and audiovisual facilities such as tape recorders, videotape, and film. Computers may be expected to play an ever-increasing role in individualizing instruction. There is no longer a need to rely on the instructor as the major transmitter of knowledge.

Appropriate learning materials can greatly facilitate the task of learners and instructors. As a manager of learning, an instructor's task today is to use those learning sources or materials which optimize learning, individualize the learning process, provide an immediate feedback, and broader experience. Judicious use of learning materials and of modern technological aids frees the instructor for the tasks he is best suited for. He can better fulfill his role as adviser and counsellor; and he can devote more time to programme planning, providing additional learning resources as required, seeing to an appropriate feedback, and in general ensuring that each student has the opportunity to learn at the best rate for the maximum attainment of his objectives.

Learning materials form an integral part of the methods used to facilitate the learning process. Before the advent of the printing press, reading aloud was a necessary function of the instructor, his method of transferring information from the manuscript to the students. Today, ready access to an enormous depository of knowledge in books, journals, films, tapes, etc. makes it opportune and necessary to use different methods of encouraging learning. All the alternatives described below have in common active participation by the learner in the teaching-learning process.

1. Discussion. Students under instructor or student direction exchange points of view concerning a topic, question, or problem, with a view to arriving at a decision or conclusion.

2. Syndicate method. A class is divided into groups of 4-6 students who work on the same or related problems in intermittent contact with a teacher and prepare a report for critical appraisal by the whole class.

3. Problem-centred groups. Groups of 4-12 students discuss a specific task.

4. Case discussion. Students analyse real or simulated problems in detail and propose solutions or decisions.

5. Individual meeting. A teacher discusses a student's needs and problems with him individually. Diagnoses, evaluation, and prescription can all be involved.

6. Programmed instruction. Students receive information from a workbook or mechanical device that has been "programmed". Questions after each step provide a constant feedback.
(7) Projects. Individual students or small groups are required to find a solution to a real-life problem.

(8) Computer-assisted instruction. Students are in direct contact with the computer through a terminal. Questions and immediate feedback are provided.

Institutional characteristics

The fourth aspect of any educational endeavour is the milieu, the physical and social environment in which the educational programme is carried out. Surprisingly perhaps, insufficient attention has been paid to environmental factors as determinants of effective and efficient learning. Yet there is ample evidence to indicate that the educational process is influenced markedly by physical conditions such as buildings and other facilities, as well as by such social conditions as communications, administrative procedures and, perhaps most importantly, the institution’s educational “climate”, the culture that is predominant in any educational institution and prescribes the norms of behaviour for all its members.

The effectiveness of an educational programme depends on the appropriateness of the physical and social milieu of a given educational institution. Much has been written in relation to industry about morale, good communication, the involvement of workers in decision-making processes, and good management practice. They are equally important in education. The milieu in which students, teachers, and administrators function is a vital factor in determining their behaviour and influencing their participation in desirable activities and the attainment of the institution’s objectives. It affects the behaviour and motivation of students to perhaps a greater extent than any other factor. Some institutions give the student a feeling of being a responsible person whose opinions are valued. He is encouraged to cooperate with his peers and learns to be a member of a team; he identifies with the institution’s objectives; and he incorporates the institution’s values into his own value system. By contrast, in other educational institutions the student is depersonalized or feels he is; he acquires the habit of competing with his peers since competition is constantly emphasized; and he expands effort solely to achieve extrinsic rewards or to avoid punishment. His relationship with his teachers is one of subservience and distrust, since they are the masters of his destiny. Education becomes a chore, a means to an end, something to be completed and forgotten as quickly as possible.

Similarly, physical conditions can facilitate or act as a major constraint to the achievement of an effective learning-teaching process. Many educational institutions recently, in response to the enormous increase in student numbers, built lecture theatres in which large numbers could be
accommodated. These lecture theatres do not permit the application of individual learning materials and thus are a formidable obstacle to the use of methods putting into practice the learning principles enunciated above, such as small-group discussion. So too the development of large universities, which appeared to permit the optimum use of costly resources, has turned out to be a major hindrance to achieving a desirable educational climate through its depersonalization of the students and staff. The development of the necessary cohesion in a community of students and staff has thereby been prevented.

Implications for the Health Manpower Planner

The distinction between manpower planning, manpower production, and manpower utilization is often more apparent than real, and is perhaps more suggestive of a priority of responsibility than of separate roles or functions. To put it differently, the roles of planners and trainers are reciprocal, each depending on the other for the successful attainment of desired ends. It is the planner's responsibility to determine manpower requirements, both as regards quantity and quality; but in doing so he must collaborate with those responsible for the actual production process to ensure that the requirements are realistic and are converted into production objectives. Those responsible for training are likewise dependent on planners to identify requirements, coordinate activities and programmes, and develop close links between manpower production and utilization, so as to ensure the provision of adequate and timely resources.

To facilitate consideration of the major implications for the planner of these principles of manpower production, it is useful to consider them in relation to some of the planner's main functions as summarized in Chapter 2.

Specification of requirements

The health manpower planner specifies the required quantity of personnel in terms of how many of each kind are required for health care. In doing so he must consider how the qualifications needed to meet a population's requirements can be acquired and appropriate educational objectives be set. For this purpose he must be conversant with the characteristics of the process of training persons to meet task requirements, and he must take into account the manpower available that, though not now having the required competence, either has the potential to acquire it or could be retrained with relatively little effort.

When these requirements have been identified, it is essential that those responsible for programming the production of the required manpower
should be fully informed of the total programme—its objectives, stages of implementation, and evaluation mechanisms. Knowledge of these plans is not only essential for the staff of training institutions but should also be available to all concerned, including students; it will assist in providing the necessary orientation and it is an indispensable element in developing a feeling of involvement. Moreover, to be effective, evaluation requires participation at all levels by planners, staff, and students of educational institutions.

The health manpower planner must join those responsible for planning, implementing, and evaluating the production programme in:

— specifying the overall goals of a country’s programme
— identifying each institution’s objectives, i.e., the output characteristics expected from graduates
— implementing the programme
— evaluating the achievement by monitoring the processes and identifying conditions helping or hindering successful accomplishment.

Coordination

Throughout this book stress has been placed on the importance of the health manpower planner coordinating or functionally integrating planning, production, and utilization. In this role he has the primary responsibility for ensuring that the manpower production process is attuned to the health sector’s needs and is constantly reviewed or monitored so that its relevance to changing requirements is maintained. Moreover, it is his responsibility to ensure that basic education and continuing education are functionally linked so that practitioners can continue their studies beyond their basic education. The planner must also coordinate the flow of recruits into the different component parts of the manpower production process.

Finally, as Fig. 10 shows, the planner should coordinate the different elements within the production process and the production process with other components of the total system. As coordinator, he is responsible for the allocation of resources, and it is in relation to this function that it is necessary to warn planners against viewing a manpower production process as an industrial process, a conveyor belt where more or less identical inputs are processed in an identical fashion to produce identical outputs. Students and teachers, the input, differ markedly, hence the process needs to be flexible to accommodate the differences. It is not only unrealistic, but positively dangerous, to attempt to draw up a simple and single specification of the resources needed. Each educational programme needs to be examined in terms of its inputs and desired outputs and then only
is it possible to specify what resources are needed within the prevailing conditions. Yet, though it is impossible to develop a universal set of specifications, some general principles may be enunciated.

One is that it is essential that teachers and administrators should be selected and trained according to the particular requirements of each programme. Staff are generally the greatest continuing expense in education, hence their performance is of great importance if only to minimize wasteful expenditure. Staff selection criteria need to be carefully developed. Special training programmes usually need to be developed along with a procedure for the continuous evaluation of staff performance.

Another principle is that, because planning an educational programme requires considerable effort and expertise, sufficient time must be allowed to develop the plan prior to its implementation.

A third principle is that the health manpower planner and the producer should cooperate to define student recruitment and selection policies. In general terms selection criteria should approximate as closely as possible to eventual job requirements and take into account characteristics that are known to enhance the likelihood of students obtaining the required qualifications. The adoption of such criteria will in most cases lead to the disappearance of the prevailing almost exclusive reliance on past academic achievements as the selection criterion.

The importance has been noted of carefully choosing learning materials and of making adequate allowance both for the development of new materials and for the effective use of the learning materials already available. In the long run expenditure on learning materials is likely to be more than offset by the saving in staff costs.

Careful planning of capital expenditure is important owing to the high initial expense. Educational facilities should be functional, flexible, and efficient rather than grandiose and non-functional.

**Monitoring and evaluation**

Another function of the health manpower planner, as well as of all those involved in health manpower production, is monitoring and evaluating the implementation of the programme. It is essential that every part of a programme should be constantly reviewed on the basis of systematic and reliable information. In this sense evaluation is a process permitting informed judgements on the character and quality of a programme. To ensure that such judgements are informed, it is essential that the information should cover all the relevant features of the programmes; that the information about the programme is valid and reliable; and that the final judgements should be based, where possible, on explicit and verifiable
criteria. Since a judgement involves a weighing of alternatives using criteria and scales of comparison, it is effectively dependent on the availability of accurate information from as many sources as possible.

For educational programmes in particular it is insufficient to seek answers to the question whether the programme works or not. A fuller understanding is needed of what the programme really was, whom it reached, and how and in what context it functioned. An educational programme is multidimensional in character and involves more than just a notion of its quality or value. Only on the basis of full knowledge of its character can a decision about its quality or value be made. It follows that evaluation requires detailed and continuous monitoring of what is happening, not just information on whether objectives are actually attained.

Research and development

Not only must the process of manpower development be constantly monitored and evaluated, but research should also be undertaken to develop new solutions to old problems and to new problems as they arise. In relation to the teaching-learning process, for instance, there is an urgent need for research to improve understanding of learning itself, on how to stimulate it, on how to train teachers, and on how to develop and use evaluation and feedback mechanisms. Every educational institution should be as active in educational research and development as it is in research in other areas. There is a need to study the relationship between educational programmes and professional behaviour and, perhaps even more importantly, to study the planning process itself.

SUMMARY

This chapter outlines some general principles or guidelines for the development of a health manpower production programme. An approach is set out that provides a framework for planning and emphasizes the interdependence of health manpower planning and health manpower production. An inherent danger in planning is that it may be insufficiently oriented to meet the requirements of the future. A manpower production process takes time and, by the time a graduate enters professional work, conditions and health care requirements may have changed. The planner must therefore be committed to flexibility, constant reassessment, and the development of alternative strategies. An educational programme needs to pay constant attention to the provision of opportunities for the learner to develop the ability to adapt to new requirements. In today's rapidly changing conditions it is not sufficient to produce health manpower able to apply only today's knowledge; rather, the graduate must know how to obtain, process, and apply information to new situations. He must be trained to evaluate his own performance and to seek constantly to improve his professional competence.
For the actual programme planning, a sequential procedure is proposed leading from health requirements to programme objectives and finally to institutional objectives. In relation to the latter, guidelines are set out for specifying educational requirements, this in turn permitting the specification of more detailed objectives and appropriate learning resources, the whole process being constantly reviewed and evaluated.

In relation to the actual manpower production process, attention is drawn to several conditions known to affect the efficiency and effectiveness of educational programmes. The use of inquiry methods is emphasized; in these the learner has the maximum responsibility for his own education, his activities are paramount, and learning is oriented towards application and problem-solving rather than the recall of information.

Finally, because planners and producers have reciprocal roles, the need for the constant coordination and integration of activities is stressed.