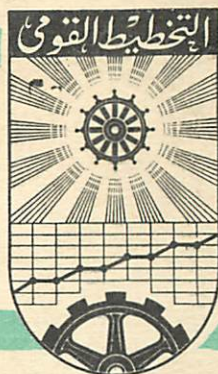


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ESTIMATION OF NEEDS AND DEMANDS FOR
HEALTH SERVICES AND FORMULATION OF
THE HEALTH PLAN

By

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I. HEALTH AND SOCIO-ECONOMIC DEVELOPMENT:

Good health is one of an individual's most highly prized possessions. It is a deep and intimate concern. It stands first and foremost as something to be preserved in its own right. Regardless of variations in cultural expression, expression, human society gives credence to this view by the various codes which protect the individuals right to life.

Illness is perceived as a threat to that right. Hence society has developed techniques for dealing with illness. Whether those techniques be exercised by the M.D., the Shaman, the priest, etc. they all have the aim of restoring the sick person to health and implicitly of restoring him to his community as an active member. It is with this latter aspect that health planning is properly concerned. The restoration to a state of "health" of the individual is not the domain of the health planner. Governments are concerned rather with all that goes into making it possible for the individual to have access to the health technology so that individuals will be maintained as active functioning members of their communities. Hence while the health authorities, by the very fact of their functions, have committed themselves to the view that health is a right, they also recognize the inherent paradox that the expression of one man's right to health is often at the expense of that same right of other men. Health authorities view health planning as an instrument which the government can apply to relieve this inherent inequity as much as possible in the light of overall national objectives. "As much as possible" for the simple reason that the health authorities must think in terms of the community and this involves making a decision about which segments of the population are to

get what quantity and quality of the available health services. Such decisions often imply a judgement that health, while it is an end in itself at the level of the individual is also a means to the end of development when considered at the level of the community.

Also, it is worthwhile considering the obverse of health, i.e. illness. First of all the costs of ill health are many, varied and great. Entirely aside from the personal misery and discomfort suffered by the individual and his family, the loss of time from work and decrease in productivity are very important factors in the cost of ill health. Not only does worker's illness cut down the family income, but a sizeable part of productive capacity is lost to society given certain assumptions about the labour supply. To the degree that poor health can be eliminated and the costs of sickness spread by public programmes and policies through insurance techniques, then to that extent the individual's economic burden due to ill health can be relieved.

Great gains have been made in recent decades by the medical profession. Diseases which were fatal and which attacked in epidemic form are now on the wane in many countries. The span of life and consequently, the span of productive life in most countries has been lengthened and infant mortality has been greatly reduced in the industrialized countries. A great deal remains to be done with respect to endemic and epidemic disease, infant mortality and public health in the developing countries.

There is no doubt that the world community at large possesses the resources with which to provide a reasonable level of medical care for all but there is as yet no way whereby these resources are made available to everyone. It is hoped that a consideration of the consequences of

ill health as they affect development will lead to a better integration of health with socio-economic development in general. Sickness is, in fact, similar to unemployment and industrial injury in its economic consequences. In an economic sense, sickness and injury are even more serious than unemployment, since they add the burden of medical costs to the regular expenses of maintenance. Unfortunately, however, our information and knowledge about the extent of sickness and its concomitant impact on economic status in developing countries is extremely sketchy. In spite of this, it is useful to consider some points about the value of health to the individual and to the community.

Investment in Health

Expenditure on health services could be considered as an investment because it adds to human capital, although national accounts classify expenditure into current and investment and prefer to use the term development expenditure as a compromise. In the introduction above the author alluded to the economic effects of ill health and to the fact that so many health hazards for which a technology is known remain to be controlled in the developing countries. One of the great problems in developing countries with respect to investment in health is not so much that there is not enough investment - although this is often the case - but rather that even what investment there is remains unproductive because all most investment in developing countries in the feeding and raising of a new generation for productive work and a great deal of this is unproductive simply because of the high death and disability rates.¹ With these facts before us it is clear that health activities can be viewed as wealth creating activities (assuming

that family planning is an integral part) in that they free the developing countries from the fatal, disabling and debilitating diseases that rob the third world of productive potential.

The wealth creating or investment aspect of health activities in the third world is but one aspect of healths' instrumentality in achieving development. There is evidence that attitudinal changes associated with the availability and accessibility of modern health technology influence behaviour patterns conducive to social changes necessary for economic development and modernization.

Taylor has pointed out that the increase in life expectancy due to health activities carries in its wake a whole new orientation toward time and toward investment². Throrough health education introduces empirical cause and effect explanations of phenomena previously misunderstood. Since health education reaches people directly and intimately, the relationship between disease and poor sanitation and other environmental factors, when explained, lay the foundation of the empirical approach to causation which can then be reinforced in the industrial and agricultural enterprises of modernity.

It is possible to conclude then that health contributes to socio-economic development by contributing:

1. to the inculcation of attitudes amenable to economic development and modernization;
2. to the productivity of the labour force.
3. increase in quality or stock of human capital.

The Need for Health Planning :

Taking national socio-economic development planning as a given the next step is then to discuss the place of planning for health within the context of development planning.

What we call national development planning has come about in recent years as a result of a fairly wide-spread conviction that government should be the prime mover in producing economic development and modernization. Central planning, which is but one approach to national development planning, has emerged in developing countries as the favoured approach. This has been due to a whole host of reasons among which are: the desire for social reform along with development; wide-spread and serious price system imperfections; the inability of the market mechanism to cope with the large structural changes over long periods which is essential for development; demands for a redistribution of income, diversification of the economy and freedom from foreign domination, etc. as well as the provision of sufficient social goods and services to meet the various needs of the growing population. Another argument which has claimed a considerable number of adherents throughout the world is that the challenges to development are more wide-spread and much more serious than they were for western countries in their pre-industrial period and hence the scope for the individual will be far from being sufficient to realize the required structural changes in a developing economy.

For various reasons, some of which have been alluded to above, we find that national socio-economic planning is viewed as the instrument by which a government seeks to accelerate the rhythm of social

changes and the rate of economic growth in its country in order to raise the standard of living.

Aside from the social welfare issues involved, successful economic and social planning depends on the ability of people to realize their individual capacities which cannot be fully utilized as long as the present major barriers of disease and inadequate health and sanitation facilities continue to exist. Among the more important categories of activities that improve human capabilities³ are health services. Health activities have both quantity and quality implications. All too frequently, however, health activities have been funded by government, if at all, on a residual basis or left almost entirely within the domain of the private sector. In either case, services then tended to be provided on the basis of the well known principle of non-planning i.e. "he who shouts the loudest gets the most", and also on the basis of "he who can pay the most gets the best", irrespective of need. This is not to deny the contributions of the sincere well-intentioned individuals and institutions involved in the provision of health care in so many countries. Rather the intent is to point out that the non-planned "everyone does his own thing" approach to health care has led to great inequities at the least and has in many cases resulted in an effective denial of the right to health care to the poor, the disabled and the powerless.

While planning is not a palliative for all problems encountered in the health system it is nevertheless a means of overcoming certain aspects of arbitrariness which result from unplanned situations. After all, if a country does not make choices through health plans, the choices will be determined anyway but very haphazardly

either by ability to pay, geographic location, by publicity given to a particular case or class or health hazard, or to a new technique, e.g., heart transplanting, and the like⁴. Planning at least has the advantage over non-planning in that it provides the decision maker with a rational method for allocation of health resources to achieve specific health objectives i.e. provides a mechanism for

1. rationing the country's existing health resources;
2. detailing a course of long range action to increase the supply of health resources which require long years to develop;
3. implementing methods whereby the productivity of existing health resources can be increased.

Problems of Health Planning

The health planning process involves four fundamental stages:

1. the choice of goals, objectives and targets;
2. the assessment of resources (human, physical and financial);
3. the assessment of possible outcomes;
4. the assessment of possible side effects.

Problems encountered in health planning will relate to one of these four major stages. In addition, most countries attempting health planning find that they have certain broad areas of deficiencies which must be taken into consideration. These deficiencies have been dealt with extensively by others⁵ hence the author will only touch upon the most critical. They are:

1. Lack of Resources - which has contributed to badly planned facilities, lack of research and development, poor utilization of manpower, and inefficient organization.
2. Isolated Attempts at Research and Development - Research has been done mostly at big university hospitals but the lack of a system for getting the results to the people quickly halts the advance of health technology.
3. Specialized and Skilled Manpower hardly ever seen as an investment - Lack of resources contributed to the problem of inefficient utilization of manpower and vested interests of the medical profession and long established paramedical professions such as nursing led to blocking of entry into professions as well as to blocking of attempts at the logical delineation of tasks.
4. Haphazard Organization - Developing countries suffer greatly from the dubious "legacy" of various health care delivery systems imposed under the colonial era. The Camroon, for example, one half of which was under French administration and the other under the British, faced a tremendous organizational problem with health services at independence. Organizational innovations in the health sector are often met by resistance from the medical profession.
5. Lack of Public Participation - Modern scientific medicine has, until very recently, been entirely devoid of public participation. The doctor was viewed as the sole agent responsible for health care delivery and all the decisions that implied. Still in many countries the doctor is also the hospital administrator although he may not be trained for this

task. The patient, i.e. the client is forced to assume an entirely passive role once he submits himself to treatment. This is true to a large extent even in those countries where the patient assumes the burden of paying either personally or through his health insurance.

In addition to what might be called the five macro level problems which face the health planner, there are a multitude of problems involved in the planning process from the inadequacy of the data base to the complex decision as to what approach the planner will take to health planning, i.e., which of the following statements will he choose as the basis of his plan :

1. one person's life is as important as any other; versus
2. one person's health is as important as any other; versus
3. the life of certain people is more important to the community than the life of others⁶; versus
4. the health of certain people is more important to the community than the health of others.

The implications of any of the four choices are very far reaching. This choice is, in fact, the single fundamental choice the planner makes either implicitly or explicitly. For such a choice determines the planning goals, objectives and targets. When the planner elects options one or three he will have to minimize the number of deaths. If he chooses option three he will make a judgement concerning which segments of the population should be targeted for the service components necessary to minimize the number of deaths and his allocation patterns will be drawn up accordingly.

Options two and four imply the use of techniques to maximize health. This is more difficult since it means that the planner must not only consider the number of

deaths but also the amount and extent of disability and debility if he is to maximize health. A choice of option four means that the planner has to decide which segments of the population would be targeted for maximization of health. While to date no technique has been developed for maximizing health in the sense defined above, the GENDES methodology has been used for planning based on minimizing deaths.

Very few attempts have been made to develop a linear model for minimization of deaths on the macro level. Recently, Correa and Hassouna published a model entitled: Planning for Health of Infants and Children in Egypt (Nov. 1972). It is a macro linear model for optimal allocation of health resources to minimize infant mortality in Egypt from the three main causes of death in the age 0-4 gastroenteritis, bronchitis and measles.

Once these fundamental decisions have been made, the planner then begins the first stage of the process of planning, i.e. delineation of the goals, objectives and targets of the health plan. It is with the second stage of the planning process that the author is most concerned in this paper, i.e. assessment of resources. More particularly we are concerned with the question of estimating the needs and demands for health services which in reality comes to the estimation of the needs and demands for resources. It is to this question that we shall now turn.

II. ASSIMILATION OF NEEDS AND DEMANDS FOR HEALTH SERVICES

Wants, Needs and Demands

The familiar saying, "our wants are many, our needs but few" appears to have a good foundation in fact. It has been suggested that three factors - environmental, industrial and conventional - are discernible in the development of human wants for commodities and services. The environmental factor is largely a matter of climate and affects one's preferences for clothing and shelter in so far as these goods are used for protection against the weather. It also affects one's needs in the matter of food and fuel. The industrial factor is responsible for differences in the needs of persons engaged in unlike occupations. For example, the labourer who engages in hard manual work requires a complex of goods and services that differ from his counterpart of the same age and condition who has a desk job.

If the environmental and industrial factors alone affected human needs, we should find that needs and wants were practically identical, i.e. that the goods and services a man wanted sufficiently enough to use a part of his disposable income to buy them (demand) would be the ones needed as a matter of personal well-being. But the conventional factor enters into the situation and drives a wedge between needs and wants. The conventional factor referred to by economists as the demonstration effect leads the less wealthy to imitate the more wealthy in the effort to avoid any suspicion of inferiority. This distinction between needs and wants has to be drawn to make way for the observation that as long as imitation and competitive consumption play a part in determining man's wants, so long will there be no limit to the expansion of human wants.

This multiplication of human wants would have no economic significance if the means of fulfilling them were unlimited in quantity. But as wants expand it becomes evident that only a limited quantity of⁷ the goods and services needed for the satisfaction of human wants is available. This is the fundamental cause of the scarcity problem in economics. In many developing countries, goods and services are so scarce and population so dense that some of the needs of the low income groups - leave alone their wants - are not fully satisfied. The standard of living is low because the volume of production of goods and services is too small relative to the size of the population. The results of such a situation are painful since they include for many millions of people the lack of adequate food, clothing and shelter not to mention such things as educational, recreational and cultural advantages that help to make life worth living. Generally when we say "adequate" clothing, shelter, etc., we base our concept of "adequate" on what is culturally defined as such. In the case of food, however, nutritionists have been able to establish certain levels of minimum food requirements which insure biological survival. They are scientifically "adequate" but in most cases would not be considered "adequate" by us for ourselves.

The fulfillment of human wants is interfered with by the existence of wide differences in incomes. Economic wants are satisfied, if at all, through the purchase of commodities and services. Those who have large money incomes stand a good chance of having their wants satisfied. Those with small incomes must manage to get along with some of their genuine needs not fully satisfied unless some power, usually government, intervenes in the process to adjust market inequities.

- 1 -

Such a situation sets before us the basic elements of the economic drama. On the one hand is man as a consumer of commodities and services, seeking to gratify human wants that seem to be capable of indefinite expansion. On the other hand is a shortage of economic goods and services without which man's wants cannot be satisfied. Hence the scarcity of goods and services is related to the scarcity of the factors necessary for their production.

The term "demand" has a more precise meaning than want or need. To the economist there is no such thing as demand apart from price. Demand to him signifies much more than the desire for economic goods and services. Demand includes the desire for the good or service plus the willingness and ability to use part of his income to purchase it at a stipulated price. It is this basic difference between wants and needs on one hand and demand on the other, that differentiates between the techniques that are generally used for estimating them.

When applying the above discussion to "health", one can talk about the need of man for health services to assure his biological survival at various levels of well-being. The fulfilment of these needs can be measured in terms of life expectancy, morbidity, mortality and disability rates, control of epidemic diseases, deficiency diseases, occupational diseases, communicable diseases, degenerative diseases, nutritional diseases, old age diseases and many others. They can also be translated into needs for action in the field of health services, and might be expressed as the need for available and accessible health technology to regulate health hazards which affect the levels of well-being of man in his environment.

This can further be translated into the need for

- better distribution throughout the country of medical care facilities and qualified personnel;
- better trained and educated public health personnel;
- pooling of health resources by small villages and towns;
- more and better health education.

In applying the concept of "wants" to health, one can view them as individual desires for comfort and convenience more the satisfying real health needs. This plays a very important role in determining the construction, equipment and staffing of health facilities and is a very clear example of the demonstration effect in health services. One can witness the serious impact of this phenomenon on the shaping of health systems in many developing countries with costly building, highly sophisticated equipment and either no staff or poorly qualified staff. Such health systems become a burden on the economy and most of the health resources are transformed into bricks and mortar and sophisticated equipment which are rarely if ever at all used. This, in turn, raises the cost of health services and may augment the feeling of social distance between low socio-economic strata of the citizens and health practitioners and hence become a barrier for utilization of health services by such citizens.

When talking about needs for health services one must distinguish between public health and medical care services. There is a vast difference between the impact of the two. The spectacular fall in the death rate over the past hundred years owes very little to medical care. The great killers of millions have been wiped out at relatively small cost, using the services of few doctors by improving the water supply or by environmental sanitation programmes other than water supply and vaccination. Hence we can say that any country has a certain level of need for environmental

health services. That need can be defined as that level whereby the population in general is provided with: freedom from epidemic disease; safe water supply; freedom from air pollutants; mechanisms for the control of endemic diseases. By such a definition, it appears that no country really has met that level of need since air and water pollution constantly threaten man in the western industrialized as well as the developing countries.

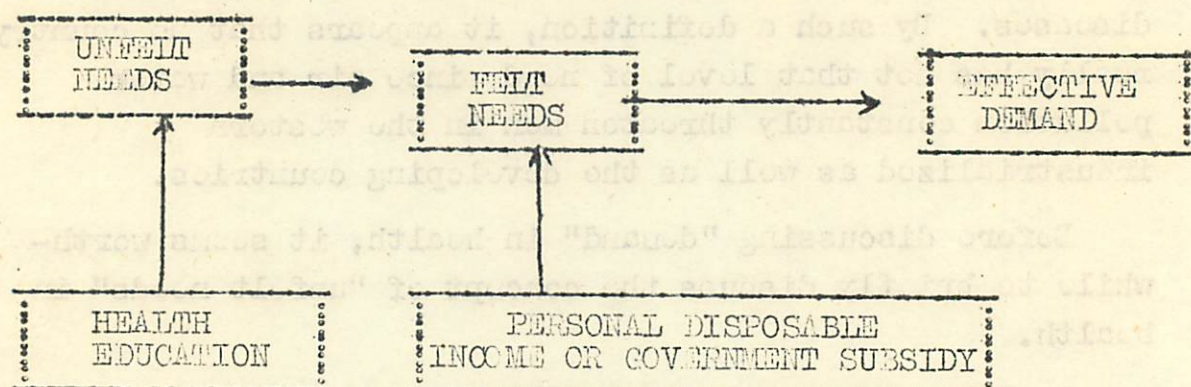
Before discussing "demand" in health, it seems worthwhile to briefly discuss the concept of "unfelt needs" in health.

Health needs may be acute but not always perceived as needs for medical care by the individual because of lack of knowledge. Hence the question of determining what those unfelt needs are becomes an important one. The target population can be surveyed and an estimation of unfelt needs made. Health professionals, social scientists and biostatisticians would have to cooperate in the design of the instruments and in the analysis of results.

Health education is a means of transforming the unfelt to felt needs. The change from felt needs to effective demand requires either an increase in personal disposable income to enable the individual to purchase the amount of medical care services arising from his new awareness and acceptance of the need for medical care. Another way to change felt needs to a demand for medical care services is by government subsidization of the health service. These concepts are simply illustrated in Figure 1.

Figure 1

CHANGE FROM UNFELT TO FELT NEEDS AND
TO DEMAND FOR MEDICAL CARE SERVICES



In planning the medical care delivery system the health planner and the decision makers (i.e. politicians) determine the size of expenditure on medical care within the context of the country's overall expenditure capability. This brings us back to the fact of resource limitation and the realization that it will be impossible to satisfy all the unfelt needs if they become felt needs and then demand. There is an ethical question that health planners and politicians face which can be succinctly stated as follows : How much should we allow unfelt needs to rise to the level of felt needs ? Do we, in fact, have to suppress the rising of unfelt needs because there is no way to meet the needs that would arise ?

Demand for Health Services :

Let us now turn to discuss "demand" for health services by identifying some of the characteristics of health which have economic implications affecting demand. These characteristics are⁸ :

1. The Unpleasant Nature of Illness and its Unpredictability:

People do not really desire many health services in the same way that they desire other goods (e.g., food, clothes, cars, hotel services, etc.). Hence we must use the word demand in a qualified sense when applying it to health. Demand is defined as a desire for some good or service for which the individual is willing to pay the stipulated price.

The difference between demand for health services and demand for other goods and services is compared as follows:

DEMAND FOR HEALTH SERVICES

DEMAND FOR OTHER GOODS & SERVICES

- | | |
|--|---|
| - Triggered by the need to avoid pain and discomfort. | - Not always triggered by the need to avoid pain and discomfort (except for hunger and weather conditions). |
| - No substitute in most of the cases. | - Substitutes are relatively more. |
| - Minimum amounts of health services. | - Except for food, clothes and shelter no minimal amounts are indispensable. |
| - Price and income effects do not greatly affect the decision to consume or not to consume, but just change the source of health services. | - Price and income effects largely affect the decision to consume or not to consume (again with the exception of some vital goods which are necessary for biological survival). |
| - Price and income effects might work after consumption of minimum amounts. | - Price and income effects are operative |

Although some health and medical services occur regularly as preventive measures which we adopt to maintain our health, those which are associated with illness are unpredictable at the level of the individual while at the level of the community we can predict rates of illness. These two facts lead to the desirability of pooling individual payments so as to defray the costs. This can be done either through schemes of prepayment, and private and governmental health insurance or a combination of all three. The agency, whether government or private, which then has control of these pooled investments is in the position of a particularly powerful buyer of health services. The insurer together with the physician who is the patient's first point of contact, influence the demand for service rather than the patient himself. (e.g., it was found that when physical and speech therapy came under insurance in one country the demand for these services far exceeded the estimations⁹).

2. Health and Medical Care as a Need :

Health is one of the few goods and services which is generally recognised as needed. In this respect it is noted by economists that there are really two differences between the medical concept of need and the economists concept of demand. The first is the fact that medical need may exist even when the individual is unaware of it or does not realize or accept the ability of medical care to meet it, and the second is the purchasing power and ability to pay to meet the need.

3. The Client's (i.e., Patient's) Inability to Evaluate Health and Medical Care Services Due to his Lack of Knowledge :

This has the effect of making the patient dependent on the health professional. Hence, it is the health professional

usually the doctor, who is really determining the "commodity" that the patient is buying. This puts the doctor in a unique position. That position is called a quasi-monopoly or limited competition position by the economists since the doctor is both the buyer and provider of the service and because, with respect to his patient, he controls the market.

4. Mixture of Consumption and Investment Elements

The gap between health professionals, economists and national accountants on this point is becoming narrower and is resulting in compromise terms like "developmental expenditure". The importance of resolving the conflict is to enable health planners to have a better case for the acquisition of more resources for health **services** on "rational" grounds. Experience shows that this rationale is not always helpful and that the political rationale in many cases is more effective.

5. Large Component of Personal Services

Health and medical care services are composed largely of personal services. The health sector, unlike the industrial sector, is not characterized by gains in productivity, although such productivity can be estimated by time spent in performing health activities at a certain quality level yet very little have been demonstrated in this field. Hence, the increased **salaries** for the personal services are not offset by productivity increases to nearly the same extent as they would be in industry. This is one of the principle reasons why planners in health have such a difficult time justifying their requests for more manpower, especially in a situation where the pool of usable labour is small¹⁰.

These then are some of the characteristics which distinguish health and medical care services from other goods and services. Some of these traits, as we have seen, influence estimation of the need for health services.

The economic bases for public intervention in health services have been dealt with at length by Klarman¹¹. Briefly they are:

1. being among the category of social goods government intervention to make them available, especially to low-income groups. This is true especially in cases where large amounts of financial resources are needed e.g., spray campaigns, fluoridated water supplies, etc.;
2. the fact that external benefits derived from such public health measures as vaccinations make for a divergence between community (social) benefits and individual benefits, hence necessitating intervention to protect the community.
3. the fact that individuals are likely to under-invest in those areas where large and costly facilities must be built (e.g. water works, sewage disposal plants, anti-pollution plants, etc.) to protect not only themselves but generations to come, leads to the necessity for intervention.

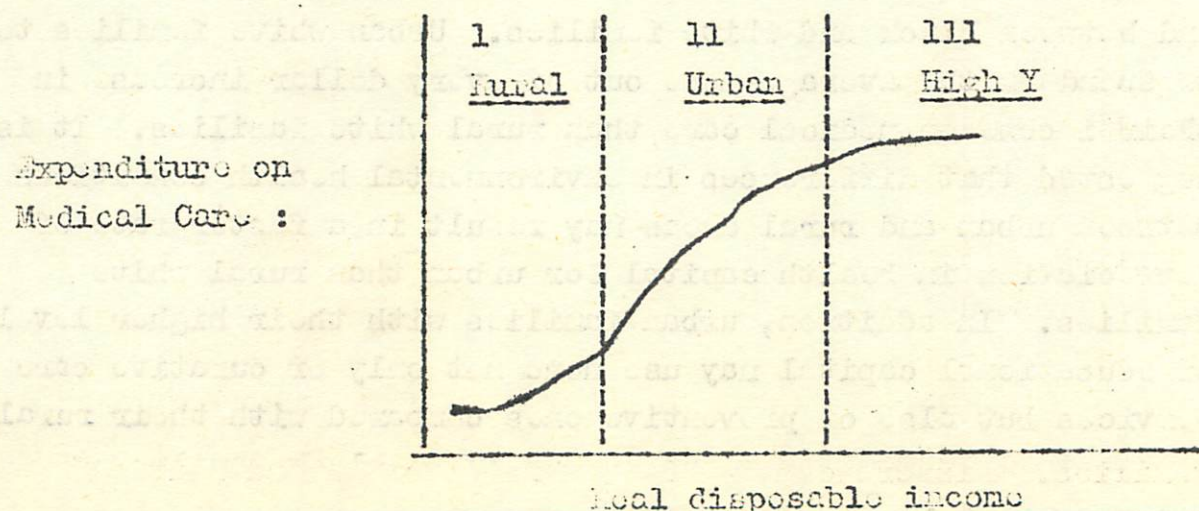
With regard to personal health services, governmental intervention is justified primarily in order to assure an equitable distribution of services; to counteract the working of the unreliability of the consumer choices if left to the market; to insure a certain minimum level of available and accessible service to all while providing additional services to other segments in the light of health and national plan objectives. At this point, it may be interesting to present some of the main conclusions and implications of a study done

by El-Morphy^{9(a)} to analyse influences on the demand for medical care services in USA. These are as follows

1. Real disposable income is an important variable in estimating the demand for medical care services in the United States. Expenditures on these services tend to increase as real disposable income (both at the macro and micro levels) goes up. Nevertheless, the proportion of total income spent for medical care does not necessarily decline as suggested by previous research (Klarman, 1965). Instead, it may decline, increase or remain constant depending largely on the degree of Organization and the level of income. The relationship between expenditures on medical care and real disposable income may be hypothesized to take the shape shown in Figure 2 below. Here, changes in income within certain ranges of income levels, primarily low (I), moderate (II), and high (III) ranges,

Figure - 2

Hypothesized Relationship Between
Medical Care Expenditures and Income



are likely to be associated with varying levels of medical care expenditures. In other words, the responsiveness of these expenditures to changes in income will vary from one range of income to another. If the level of income is lower, as it is on the average for rural families, increases in income will probably be associated with less than proportionate increases in medical care expenditures (Range I). This is the case of many rural people and some less developed societies. With increased income (and greater education), probably beyond a certain relatively low level, expenditures on medical care may increase at an increasing rate due to the health problems of urban life and to a rising concern for protecting the educational capital being acquired (Range II). This is most probably the case of people who have acquired some intermediate levels of education such as high school, technical schools, and occasional college degrees. It is also the case of a less developed society which has undertaken a progressive ambitious programme for economic development. Finally, as income reaches a certain high level, the proportion of family income spent on medical care begins to decline (Range III).

2. There are indications that differences exist in the investment in health capital between urban and rural families and between black and white families. Urban white families tend to spend on the average more out of every dollar increase in their income on medical care than rural white families. It is suggested that differences in environmental health conditions between urban and rural areas may result in a faster rate of depreciation in health capital for urban than rural white families. In addition, urban families with their higher level of educational capital may use more not only of curative care services but also of preventive ones compared with their rural counterparts. Similarly, urban and rural black families tend to

counterparts. Similarly, urban and rural black families tend to spend on the average more out of every dollar increase in their income on medical care ($MPC = .039$) and their expenditures are more responsive to changes in income than is the case with white families especially those in rural areas ($MPC = .027$). These differences may also reflect, in part, differences in "relative income," not just absolute levels of income between black and white families. They certainly do not reflect higher permanent income (relative to transitory income) for black families. Differences in educational capital and initial stock of health capital have been also suggested by Austier, Leveson and Sarachek (1969). These explanations suggest that efforts directed toward formation of health capital might think about taking into consideration differences in the relative needs, also reflected in the private effort made by each group. Policies which are directed toward low income groups without differentiating between the ethnic backgrounds of these groups may not maximize the effect from each health dollar spent.

3. Developing countries with an inherently high rate of illiteracy and early mortality, and which attempt to adopt ambitious programmes for rapid development part of which is a massive educational programme, must also accompany this by a health care programme that increases longevity and aids vitality. Education is likely to aid in creation of a concern for "good health". Hence, planning needs to provide for adequate health care facilities, for growing demands for medical care services can otherwise lead to exceptionally high prices.

4. There are some indications in this study that insurance plays a role as a "price proxy" in estimating the demand for medical care. It may change the sign of the coefficient of current prices to positive, instead of the usually expected negative sign. The effect of insurance

coverage is not, however, the same for the various components of the demand for medical care. Components which do not have adequate coverage by insurance policies, such as drugs, tend to have the usual negative price coefficient, suggested that when the prices of such components go up, patients with low income may try to get by with less than adequate amounts. Policies are often directed toward keeping the prices of some of the basic components of health care at relatively low levels, in order to help the society expend its stock of health and consequently of human capital.

5. The stock of health capital which is expressed as some inverse function of age, has a significant effect on the demand for medical care services. The stock of health capital according to the present study, tends to decrease with advancement in age resulting in a widened gap between actual and desired levels of health, and thus increase expenditures on medical care services. Differences in the stock of health capital and its rate of depreciation may account, in part, for the observable differences in medical care expenditures between urban and rural families, and black and white families.

Let us now conclude our discussions about "demand" for health services by emphasizing the following general points which must be taken into consideration in the analysis of demand for health services :

1. We must differentiate between various types of health services, namely, between curative and preventive.
2. We must differentiate between various levels of health services, e.g. general practitioner services versus specialized services.
3. Age and sex structure of population must be taken into consideration as it affects the demand on various types of health services.

- (4) The difficulty or impossibility of substituting one type or level of service by another.
- (5) Disposable income is not the most important factor which influences demand for health services, cultural factors may play more important roles such as: the value of human life, fear of death, belief in impact of health technology on disease and death, proximity of treatment resources, social distance between citizens and health professionals, stigma and many other factors like price of other vital commodities, family size and educational level.

The following represents a demand function for health services.

$$Q_{HS} = f(Y_{Ft}, \frac{Y_{Ft}}{Y_{Ft-1}}, PH_s, P_o, Z, \frac{H_t}{H_{t-1}}, L, C)$$

Y_{Ft} = Family income

PH_s = Price of health service

P_o = Price of other commodities

Z = Size of the family

$\frac{H_t}{H_{t-1}}$ = Change in the level of health

L = Loss of income due to sickness

C = Cultural and educational factors.

III ESTIMATING NEED AND DEMAND FOR HEALTH RESOURCES

Health Activity Resources

Estimating needs and demands for health services draws attention immediately to estimating demands of resources needed for health activities. For in the economic sense the demand is a derived demand. Therefore we shall deal with this question by discussing resources needed for health activities. Resources can be either physical, financial or human. The importance of financial resources is that they enable us to buy the physical and human resources needed. Strictly speaking, the capital and recurrent financial resources are not as important for the purposes of our discussion since the need for them is derived from the physical and human resource requirements.

The physical resources of the health sector are the durable assets which include buildings, water supply systems, laboratory and transport equipment, supplies of medicine, all inventories, and all other materials. Health workers, i.e., that part of the labour force engaged in health sector activities, constitute the human resources. Human and physical resource estimates must always start from an inventory of existing resources. While taking stock is a simple concept, it is a time consuming and frustrating activity in many developing countries. The question of deciding what proportion of physical resources should be charged to health which are also shared by sectors other than health e.g., water supply systems, is relatively simple. These kinds of decisions must be made first and then the inventory of resources is made. It is best to draw up the inventory in terms of units, i.e., those associated with hospitals, clinics, etc. Human resources should ideally be inventoried by major function, in reality they are inventoried by job title, e.g., doctor, nurse, etc. After the inventory of present resources is completed, leaving aside the question of how well they are utilized, the next stage is to begin the actual process of estimation.

In health, the need for and utilization of physical resources is dependent on the human resources to a far greater extent than in the goods producing activities. The health

activity is said, therefore, to be a labour intensive activity. In a labour intensive activity the human resources become the main determinants of the demand for the goods or services produced by that activity and this is true with the health activity. In the rest of this paper the author will deal at length with the estimation of human resources in order to illustrate some of the conceptual problems involved. Examples will be given of some estimation methods. In brief then, the estimation process is as follows:

- (1) Inventory existing resources;
- (2) Review health plan objectives, i.e., what is it that we want to accomplish in x amount of time;
- (3) determine the amount, quality and assignment of resources necessary to augment health plan objectives.

The health planner is constantly faced with the health administrators who talk about the terrible shortage of health manpower. Because the word is so frequently used, it is useful to examine this concept with respect to estimation of manpower needs.¹² Shortage has been used to mean:

- a vacancy in a budgetted position. This definition comes the closest to what the economist calls the demand for the resources. In this case the hospital, clinic, etc. desire a certain specified quantity and quality of resources and express willingness to pay for it by budgeting a position for it.

- a lack of applicants for new or projected positions.
- lack of ability to keep the manpower.
- lack of ability to provide any service.
- ability to provide service but with a lesser trained level of personnel.
- availability of personnel but inaccessability due to poor geographic distribution, or to charges which people cannot afford.
- legal shortage in the sense that a legally defined and protected health profession e.g., doctors, are not turned out of the medical schools in sufficient quantity, where sufficiency is determined by some method of estimation of need.

As can be seen from the above, the term "shortage" is used in many senses with reference to the need and demand for health manpower. When estimating, the sense in which the words "shortage", "need" and "demand" are used should be made clear. A useful distinction is". "need is the amount of care believed to be necessary by medical authorities while demand is the actual use of medical care services".¹³

Several categories of indicators very frequently used to determine need for health manpower are shown in Table 1 giving some of the advantages and disadvantages of using them.

A combination of these indicators can be used in attempting to make useful estimates of need so long as the planner looks at the process of generation and utilization of health manpower.

TABLE 1: PRINCIPAL ADVANTAGES AND DISADVANTAGES OF
FREQUENTLY USED INDICATORS OF NEED FOR
HEALTH MANPOWER.

Indicators of Need	Principal Advantages	Disadvantages
I Numeric Projection based on past estimates	easy to obtain; useful to have a statement of numbers and thus provide a bench mark	lack perspective on population growth; economic trends, and geographic distribution. Implies that greater numbers alone will solve the problem
II Numbers of health personnel per 100 000 population	easy to calculate; recognizes the right of all citizens to health care	numerator of this does not consider: experience, full part time; what % involved in patient care or research. Does not show more useful facts such as: RN's/MD's/ 100 000. The denominator (i.e., population) does not always include just that medical trade area to which the numerator is related and it should. Says nothing about the way in which the personnel are used.
III Health personnel need indicated by economic factors	allows planner to distinguish between probable demand (i.e., market demand = ability to pay) and recommended service (areas where subsidy is required) by planned interference in the market. Useful in conjunction with other indicators	The option for probably demand implies that the rich will the coverage while poor people are left out or given the minimum.
IV Need indicated by Geographic factors	Useful as an indicator of present accessability of service and for pro- jecting need for future accessability	Usually stated in term of kilometres from the of service while with many diseases it is a question of minutes.

The goods producing activities of the economy, estimate manpower needs on the basis of a certain estimated unit output of a given commodity. That is, they consider manpower an input in the production process and estimate the need for it in terms of what it takes for final output. Logically, output would be the production of a unit of health but unfortunately there is no agreement as to what constitutes "health". Output tends to be measured in the health activity in terms of immediately observable products such as: workloads measures (e.g. numbers of cases examined, numbers of operations performed, etc.) and as we saw above in Table 1; by physical standards such as number of a specific health profession per 100 000 population. This presents a problem for planning and evaluation of health services which in turn affects our technology of estimating needs for health manpower. In this respect, it is important to remember that in measuring output or effectiveness and in making estimations of need we should "first determine what we should want to measure without being restricted by our current ability to measure things". This will enable us to avoid pitfalls of certain approaches which we may have to use which tend to translate each need into a common unit of measure while suppressing other maybe more relevant but "noncommensurable measures".¹⁵

El-Mofty has made an interesting attempt to analyze the demand for medical care in the USA. The results of her study

could be helpful in estimating demand for medical care from personal disposable income for low, medium and high income groups. A summary of her study is presented in Appendix A.

Before turning to specific case studies of estimation, it seems useful to consider some special characteristics of manpower and certain factors which should be considered in estimating needs for health manpower:

- (1) The formation of the required manpower with the necessary skills is a long-term process.
- (2) Manpower resources cannot be stored in the same way that physical resources can.
- (3) Manpower estimations and plans must be meshed with the educational policy.
- (4) The standard of living as well as the rate of increase in the population will have a direct impact on the targets of the health activity. This will affect the health situation in the country, i.e., the kinds of illnesses, the need for family planning, etc.
- (5) The economic structure of the economy and the future expected structural changes play a considerable role in changing the volume and the structure of the health services and consequently the quantity and type of its manpower.

- (6) The regional structure and development of the country and its extent and tempo are main factors in estimating health manpower needs and distribution.
- (7) One of the most important points is the occupational structure and its development. The following should ideally be considered when estimating future needs:
 - (a) the occupational structure should suit and promote the development of the different branches of the health activity.
 - (b) every occupational category should be clearly defined and its relationship to the other categories carefully delineated.
 - (c) the categories should be developed so that they can be translated into levels of education and training.
 - (d) the categories should be detailed enough to reflect their functional content.

In addition to the above, the manpower planners would of course like the occupational categories to be stated in such a way that they are internationally comparable. The health planner recognizes the deficiency of this point since the categories which exist internationally are often very rigid - having been built up over the last century and restricted by the present practitioners so that can in effect keep a "corner on the market". In developing countries the health planner

will very definitely be involved in the creation of new categories of health manpower. These new categories should be designed first and foremost to meet the needs of his particular country.

Estimation of Health Manpower Needs: Case Studies from Egypt

We shall now give some case studies to illustrate different techniques used to estimate health manpower needs in a developing country.

Egypt is a developing country whose government has committed itself to the belief that health care is a right of every citizen. This belief is translated into action and the stated aim of the country is to provide universal health coverage to all. All public health services are rendered and organized by the Ministry of Health. Medical care services are rendered by:

- (1) The Ministry of Health;
- (2) The public sector which encompasses the health insurance agency; the medical care organization; and the public corporations' schemes for their workers;
- (3) The private sector which consists of private clinics and a small number of hospitals and maternity homes; and
- (4) The military services which cover military personnel and their families.

The public health and medical care components directly under or accountable to the Ministry of Health constitute the largest component of services and the greatest users of health manpower. Our case studies reflect needs for these components.

Egypt is quite well off in terms of numbers of doctors when compared with other developing countries. In fact, many countries in Africa and the Arab World are serviced by Egyptian or Egyptian-trained physicians. Such international comparisons are not in fact very useful since Egyptian health administrators find that there is a "shortage" of physicians as well, and even more so, of nurses. A "shortage" in the sense that there are not enough to provide the required services delineated by the Ministry of Health in its operational manuals for health units.

In 1971, the author developed the first course in national health planning ever to be given in Egypt. The course was held from 6 April - 10 June 1971 at the Institute of National of National Planning in Cairo and was conducted in Arabic. There were 20 participants. They were doctors, nurses, health administrators and pharmacists. As topics in health planning were introduced, the participants were divided into problem solving groups and each group had a doctor, nurse, health administrator and pharmacist. One of the topics was health manpower planning. The case studies included here were developed by the author with the students and their professors dealing with this topic in the First National Health

Planning course. Dr M. Mongi, Manpower Planner at the Institute of National Planning and member of the INP Health Planning team, joined the author in conducting these case studies.

The first case study deals with the estimation of the need for general practitioners (G.P.'s). The technique used is fundamentally a refinement of an "indicators-of-Need" technique shown under II in Table 1. It is a refinement of number of doctors/population in two senses:

- (1) the numerator, numbers of doctors, was a result of an exact time and function analysis of physician activities as required by the Ministry of Health;
- (2) the denominator, the population, included just that area of the population which is supposed to be covered by those physician activities and the way in which the physicians were used was spelled out.

The assumption underlying the case studies is that we cannot estimate the need for health manpower on the basis of the quantity and quality needed to produce one unit of "health". National health targets have been stated in terms of activities to be performed by the G.P. in the health unit. Hence the next best approach was therefore to estimate needs on the basis of the time needed to perform the activities for a specific population.

Case 1: Estimation of the Need for G.P.'s

The purpose of this study was to estimate the total number of G.O.'s needed for rural health units in Egypt. The first and most important step undertaken by the group was to describe all the activities performed by the G.O.'s in the health units and to categorize these activities into one of the following: detection, diagnosis, prevention, treatment or rehabilitation.

The participants were divided into groups each taking one of the following areas: General Medicine and Paediatrics; OB-GYN; Surgery; preventive services and breaking each of these specialities down into activities. The groups, using the statistics 16 of the Ministry of Health, were able to determine the number of cases visiting the health units by speciality. They also obtained the description of activities to be performed by each speciality from the Ministry of Health manuals.

After the data had been collected and categorized it was reviewed by experts among the participants in the different health fields. Times for each activity were estimated by the experts. This second step of timing obviously involved the professional judgement of the experts. Their judgements of time-per-activity were based on their experience as Egyptian physicians practising in a health unit. Hence, it can be seen that our estimation depends to a great extent on the experience of this group of experts. In

our case study, these experts (total years of experience 200) estimated as a team, the number of cases per day which would on the average visit the rural health units spread all over the country. Each unit serves 5 000 citizens. The functions of the G.P.'s were divided into the following categories: General Medicine and Paediatrics; OB-GYN; Surgery; Preventive Services.

Estimation of Average Time

A. General Medicine and Paediatrics: In this category the average number of patients per day was 35, twenty-five of whom were for general medicine and ten for paediatrics. The estimated average time for each case was six minutes for general medicine and five minutes for paediatrics. The total time per day, therefore, was equal to the time multiplied by the number of cases for each service or $6 \times 25 + 5 \times 10 = 200$ minutes.

B. OB-GYN: This branch was divided into the following activities with the following average-time-per case estimates:

Normal delivery	= 50 minutes per case
Electric cautery of cervix	= 7 " " "
Uterine insufflation (no anaesthesia)	= 10 " " "
Loop insertion	= 5 " " "
Loop extraction	= 3 " " "
Electric painting of cervix	= 5 " " "

Training to use diaphragm	= 9	"	"	"
First aid or resuscitation	= 15	"	"	"
Gynaecological exam	5.5	"	"	"
Pregnancy exam	7	"	"	"

Table II gives the estimation of average physician (G.P.) time per day for the above activities.

TABLE II

ESTIMATION OF AVERAGE PHYSICIAN(G.P.)
TIME PER DAY FOR OB-GYN ACTIVITIES

ACTIVITY	AVG.TIME PER CASE	AVG.NO. (in minutes) OF CASES	TOTAL TIME
	(in minutes)	PER WEEK	PER WEEK
	(1) x	(2) =	(3)
Normal delivery	50	4	200
Electric cautery of cervix	7	2	14
Uterine insufflation	10	2	20
Loop insertion	5	1	5
Loop extraction	3	1	3
Electric painting of cervix	5	2	10
Training to use diaphragm	9	1	9
First aid or resuscitation	15	1/8	2
Gynaecology examination	5.5	20	110
Pregnancy examination	7	20	140
TOTAL TIME PER WEEK			513
AVERAGE TIME PER DAY OB-GYN (513 ÷ 6 days)			86

C. Surgery: This category was classified into the following expected activities and average times per case:

Bleeding	= 30 minutes
Stitches for non penetrating wounds	= 20 "
Splint	= 15 "
Urinary Catheter	= 12 "
Circumcision	= 20 "
Abscess (incision)	= 12 "
Simple Seelling (tumour)	= 22 "

Table III gives the estimation of total physician time per day for surgery.

TABLE III
TOTAL PHYSICIAN (G.P.) TIME PER DAY FOR
SURGERY

ACTIVITY	AVG.TIME PER CASE (in minutes) (1)	AVG.NO. OF CASES PER DAY x (2)	TOTAL TIME PER DAY(in minutes) = (3)
Bleeding	30	1/4	7.5
Stitches for non-penetrating wounds	20	2	40
Splint	15	1/4	4
Urinary Catheter	12	1/2	6
Circumcision	20	1	20
Abscess (incision)	12	3	36
Simple swelling (tumour)	22	1/4	5.5
TOTAL TIME PER DAY IN MINUTES			119

D. Preventive Services: An estimation was made for the average time per week for the items under this service. Table IV gives the results of the estimation of average physician (G.P.) time per day for preventive services.

TABLE IV
AVERAGE PHYSICIAN (G.P.) TIME PER DAY FOR
PREVENTIVE SERVICES

ACTIVITY	TOTAL MINUTES PER WEEK (6 working days) PER ACTIVITY
Children, various activities	160
Pregnant women	100
Recurrent complaints	120
Examination of the dead	10
Health education	10
School health services	80
Supervision of contacts	6
Supervision of Environmental Sanitation work	5
Supervision of Food sanitation	5
Supervision of post-partum	2
Supervision of vaccination	5
Vaccination by injections	5
Immunization	10
	518 minutes $\div 6 = 86$
	AVERAGE TIME/DAY

Table V gives a summary of the results of the average physician time per day for each service.

TABLE V
AVERAGE PHYSICIAN (G.P.) TIME PER DAY BY
TYPE OF SERVICE

ACTIVITY	AVERAGE PHYSICIAN (G.P.) TIME PER DAY (in minutes)
General Medicine and Paediatrics	200
OB-GYN	86
Surgery	119
Preventive Services	86
TOTAL TIME PER DAY	491

Estimation of Needed Number of Physicians (G.P.'s)

Since the average working time per day for a G.P. working in a health unit which services 5 000 people in all the different activities of that service was estimated by the group as four (4) hours per day i.e., 240 minutes, then the total number of general practitioners needed for such a unit is:

$$\frac{\text{Estimated Total Average Physician(G.P.)
Time Needed per Day}}{\text{AVERAGE ACTUAL PHYSICIAN(G.P.)
Work time per day}} = \frac{\text{NUMBER OF
G.P.'s NEEDED
PER HEALTH
UNIT}}$$

In terms of our example this is:

$$\frac{491}{240} = 2 \text{ G.P.'s / unit where one unit
services 5 000 people.}$$

The results obtained were consistent with the results which the Ministry of Health projected. Since at the time of the study the actual number was one G.P./5 000, it means that the supply of health unit G.P.'s would have to be doubled if the required present services were to be provided to the population serviced by each health unit. Further points which would have to be considered as a result of this type of study would be:

- (1) A study of the presently available G.P.'s should be done to estimate the surplus or deficit between demand and supply and the distribution of G.P.'s. This is a main tool for replanning the educational system to remedy the problem in the future.
- (2) The estimations here have been done for one occupational category only but the same technique is applicable for other categories. It would be especially useful to do the same analysis for nurses to see how many nurses per G.P. would be needed for a health unit service population of 5 000.
- (3) The total present population, the available facilities and techniques, the structure of the service and the levels of the patients were taken into consideration by our estimation. When any or all of these factors change re-estimation must be done.

- (4) The total number of the required G.P.'s will be affected to a great extent by the level and capacity of the auxiliary staff, especially the nurses. Therefore, special attention must be given to the preparation and training of this group. The Ministry of Health is aware of the problem and has set up a programme to train a large cadre of nurses at the technical secondary school level.
- (5) The study shows the need for two general practitioners per unit. To avoid the necessity of doubling the required investments for equipment and facilities manpower planners have suggested that a double-shift system could be adopted. This seems feasible in view of the fact that it was found that the G.P.'s work an average of 4 hours per day. Hence one could work in the health unit in the mornings and the other in the afternoons.

Case II: Estimation of Health Manpower Needs for School Health Services in Egypt

Case II illustrates the importance of accurate population estimates. The health planner uses the general population estimates to determine the potential number of users of the services and the health manpower requirements. This study, like the first, relies on available statistical information, expert judgement of health professionals, and desired levels of services as expressed in the health plan targets. It is also based on the concept of manpower needed per service unit for stipulated activities.

The case study is a micro as well as a macro study. It was also carried out in the Institute of National Planning in Cairo to illustrate the methodology of the estimation of manpower needs for another branch of the health service in Egypt, i.e., the school health services.

The targets of this service are to provide health services for the students all over the country. It includes all the physical, social and psychological aspects of service for primary, preparatory and secondary education. The time span of this study was the period 1970-1980. The following steps were undertaken:

- A. Projection of Population and Number of Students;
- B. Analysis of the Situation in the Base Year;
- C. Estimation of the Needs until 1980 for school health service personnel.

A. Projections of Population and of Number of Students:

The total number of students to be served by school health services depends completely upon the existing and expected population size and its age structure.

Assuming that during the period 1960-65 the fertility rates will be equal to that of the year 1960, decrease by 10% in the next 5 years until 1970, by 20% until 1975 and by 25% in the five years until 1980, the following table was obtained.

TABLE VI

POPULATION BY AGE GROUP (5 - 20 YEARS)

1970-1980 FOR EGYPT

NUMBER		1970	1975	1980
Age	Group			
5 - 10		4,795,000	4,864,000	5,430,000
10 - 15		4,110,000	4,695,000	4,821,000
15 - 20		3,758,000	4,964,000	4,650,000

The figures of Table VI were then adapted to fit with the age groups corresponding to the educational levels giving the following table:

TABLE VII

1970-1980 Population (6-17 Years) By Educational Level
In Egypt

Educational Level	Age Group	1970	1975	1980
Primary	6-11	5,686,000	6,509,000	8,036,000
Preparatory	12-14	2,541,000	2,891,000	3,257,000
Secondary	15-17	2,379,000	2,656,000	3,034,000
Total	6-17	10,606,000	12,056,000	14,327,000

The demographic projections show also that the distribution of the students between urban and rural areas will be as shown in

Table VIII

TABLE VIII

RURAL AND URBAN POPULATION (6-17 Years)
By Educational Level in Egypt 1970-1980

Educational Level	1970		1975		1980	
	Urban 43%	Rural 57%	Urban 46%	Rural 54%	Urban 49%	Rural 51%
Primary	2,444,980	3,241,000	2,994,140	3,514,860	3,937,640	4,098,360
Preparatory	1,092,630	1,448,370	1,329,860	1,561,140	1,595,930	1,661,070
Secondary	1,022,970	1,356,030	1,221,760	1,434,240	1,486,660	1,547,340
Total	4,560,580	6,045,420	5,545,760	6,510,240	7,020,230	7,306,770

These tables give the total number of students potentially needing services in the future by levels of education as well as by their expected distribution between urban and rural areas in Egypt from 1970 until 1980.

B. Analysis of the Situation in the Base Year: The year 1969 was considered as the base year of this study. Statistical analysis of the situation of the school health service gave the following facts:

Total number of schools under service = 3,997

Total number of students = 2,539,418

" " " hospitals = 3

" " " hospit = 47

" " " health units = 154

" " " dental units = 18

" " " special units = 26

These units were distributed throughout the country in the 25 governorates of Egypt except for the three hospitals which are in Cairo and Alexandria.

At the same time as this data was being collected, a group of experts in the Ministry of Health carried out a series of field studies, international comparisons and came to a standard number of occupational structure for each type of activity. We shall give here an example of estimated staff for the school health unit. Each school health unit serves 34 000 students in the base year, i.e. 1969.

Table IX

ESTIMATED STAFF FOR A SCHOOL HEALTH UNIT

Occupation	Number	Specifications
Physician	4	MBCH - Diploma (Specialization)
Dentist	1	B. of D.
Pharmacist	1	B. of Pharm.
Lab. Technician	2	Secondary School + 2 years of training
Sanitarian	1	Secondary school + 2 years training
Clerks	2	Secondary school + 2 years training
Nurse	1	Preparatory school + 3 years training
Assistant nurse	5	Preparatory school + 1 1/2 years training
Worker	10	Primary school

This occupational structure was translated to another one having seven main categories: (1) Managers, (2) High professionals, (3) Technicians, (4) clerks, (5) skilled labour, (6) Semiskilled labour, (7) Unskilled labour. This classification made the results of the study comparable with the international classification system used for all types of manpower. Table X gives the translation of the occupational structure.

TABLE X

TRANSLATION OF ESTIMATED STAFF OF SCHOOL HEALTH SERVICE
UNITS INTO INTERNATIONALLY COMPARABLE CATEGORIES

OCCUPATIONAL GROUP	NUMBER FROM TABLE IX	%
Managers	-	-
High Professional	6	22.2%
Technicians	3	11.1%
Clerks	2	7.4%
Skilled labour	1	3.7%
Semi-skilled labour	5	18.5%
Unskilled labour	10	37.1%
TOTAL	27	100 %

The same steps were repeated for all other types of units and for the hospitals.

C. Estimation of the Needs until 1980 of the School Health Service:

The targets of the health service for school children are:

- (1) To get rid of any deficit in the service which may be discovered;
- (2) To guarantee the service in the next 10 years to all students in the urban areas (those in the rural areas are served by another system);
- (3) To raise the quality of the service.

The number of students served by one unit was 34,000 in the base year.

To achieve better coverage, this figure was planned to be reduced to 25,000 students per unit in the plan period from 1970-1980. The total number of students expected in 1975 and in 1980 in the urban areas divided by the rate of 25,000 gave the number of units required for each of these years. The number of new units

required was then simply the total required (1975 or 1980) minus the existing units in that year. On this basis a facilities plan could be made to build and equip the necessary new units. The estimated occupational structure for a school health unit (see Table X) was multiplied by the total number of new units in order to obtain the health manpower needs, both in numbers and in occupations. The field study indicated that there was a shortage in the specialized unit for each two governorates for certain types of services such as speech and hearing, cardiology, etc. Table XI gives the results of the estimated number of units during the plan period 1970-1980.

Table XI
ESTIMATED NUMBER OF SCHOOL HEALTH UNITS BY
TYPE OF UNIT DURING THE PLAN PERIOD 1970-1980 IN EGYPT

Type of Unit	1970	During 1970- 1975	During 1975- 1980	Total 1980
Hospitals	3	Same as '70	Same as '70	3
Treatment units	47	" " "	" " "	47
Health units	134	120	27	281
Speech & Hearing	4	7	14	25
Dental	18	10	15	43
Psychological	8	3	14	25
Physiotherapy	3	6	16	25
Squint	1	5	19	25
Cardiology	6	7	12	25
Chest	2	Same as '70	Same as '70	2
Diabetes	1	2	22	25

As it is clear from the above table, the target was to have one specialized unit for each governorate by 1980 except for those which must be centralized or those which would be absorbed to some extent in other units. Once the number of units for each type of service for the plan periods 1970-75 and 1975-80, and the occupational structure (staff) of each unit had been determined then the total manpower needs of the school health services could be directly estimated. The following table gives the number and structure of that health manpower estimate.

TABLE XII: ESTIMATION OF HEALTH MANPOWER NEEDS FOR SCHOOL HEALTH SERVICES IN EGYPT BY CATEGORY FOR THE PERIOD 1970-1980

HEALTH MANPOWER STAFF		1970	1970-75	1975-80	TOTAL
Managerial & Admin.		40			40
P R O F E S S I O N A L	Physicians	542	270	151	963
	Dentists	204	130	42	376
	Pharmacists	52			52
	Social Workers	35	20	54	109
	Home economics	4			4
	Matron	2			2
	Others	22	15	46	83
TOTAL Professional		861	435	293	1,589
T E C H N I C A L	Lab technicians	110	7	12	129
	X-ray technicians	9			9
	Sanitarians	47			47
	Specialized Nurses	26	48	126	200
	Opticians	1	5	19	25
TOTAL technical		193	60	157	410
C L E R I C A L	Clerks	265	173	163	601
	Store Keepers	5			5
	Hospital supervisor	47			47
	TOTAL Clerical	317	173	163	653
S K I L L E D L A B O U R	Health visitor	4,827	395	489	5,711
	Nurse	70	9	36	115
	Technical worker	23			23
	TOTAL skilled	4,920	404	525	5,849
S E M I - S K I L L E D L A B O U R	Nurse	513	138	92	743
	Assist. Sanitarian	138	120	27	285
	Assist. Lab. Techn.				
	X-ray & home ec.	18	2	22	42
	Assist. Clerks	9	2	22	33
	Workers	37			37
TOTAL semi-skilled		715	262	163	1,140
Unskilled Labour		1,445	754	557	2,756
TOTAL ALL LEVELS		8,491	2,088	1,858	12,437

With table XII the estimations for Case II are completed. It is useful to make the following points which should be considered in relation to this case study.

- (1) the numbers given in the above table include the number of staff required for the central and regional administration of the service.
- (2) the managers are full-time and the managerial activities on the unit level are considered as a part-time job.
- (3) the health visitors will be distributed between the schools in the urban areas so that one of them will be in every school.
- (4) a survey of available staff by categories in 1970 was carried out to estimate the shortage or surplus compared with the estimated required staff.
- (5) Most nurses in Egypt have had primary education only and hence are not classed as either professional or technical personnel. Under the new plan of the Ministry of Health, the basic cadre of nurses will be educated in technical secondary schools of nursing. Hence this category of health worker will be upgraded in the next ten years.
- (6) a training and educational plan would have to be prepared for the plan period to guarantee the availability of the required staff for each category.
- (7) in estimating manpower needs the health planner takes the national health objectives as given. National health priorities are of course the determinants of the allocation and utilization of health manpower. It is part of the responsibility of the health planner to work with the decision makers in health (i.e., politicians) to bring to their attention any imbalances which these national priorities are likely to create, (e.g. too much emphasis on treatment at the expense of preventive services, etc.).

to bring to their attention any imbalances which these national priorities are likely to create, (e.g. too much emphasis on treatment at the expense of

- (8) the health manpower activities were translated into the seven categories of manager, professional, technicians, skilled labour, semi-skilled labour. Assignment in any category depends on the educational and/or skill level of that type of manpower as it exists in Egypt at present. It is of course subject to change.

From these two case studies we can see the type of difficulties encountered by the health planner in estimating need for manpower in the health sector.

Briefly, we might summarise these challenges as follows:

- (1) limitations of available data;
- (2) limitation of stipulated national health objectives which in turn affect the utilization of the manpower;
- (3) non-availability of health manpower planners;
- (4) necessity to rely heavily on general population estimations and other statistical information.
- (5) difficulties of integrating estimates of the health manpower with the educational estimates.
- (6) problem of reliability of information, both statistical and judgemental.

Linkage of Health Plan Estimates with the National socio-economic Development Plan

A resource assigned to health cannot be assigned elsewhere. Hence, it is important from the standpoint of the country that overall resource allocation be done in such a way as to augment national goals. Hence, health

industry relations provides a quantitative framework for a detailed study of the production possibilities of alternative resource allocations in the economy. Once such a study is undertaken, the planner can use mathematical techniques like linear-programming to solve allocation problems. Input/output analysis can also be used to indentify and eliminate bottlenecks that arise in the productive system (including service producing sectors) as a result of accelerating development. This is true because the technique enables the planner to identify the direct and indirect requirements per unit of output (no matter how output is defined) for each sector.

IV SUMMARY AND CONCLUSTIONS

In this paper, the author has discussed the problem of estimation of need and demand for health services within the framework of national socioeconomic development planning. Need and demand concepts were analyzed for their applicability to the health sector and special problems of health sector resource estimations were discussed.

Major attention was given to the estimation of health manpower needs and two case studies from Egypt were used to illustrate a refinement of the "indicators-of-need" approach to such estimations. This approach can be applied to estimation of all types of health personnel, medical and paramedical, and can be used in estimations by auxiliary/professional/population indicators. The letter is useful in order to determine the relationships of various types of health resources to each other. Since it is not possible to estimate health manpower requirements based on the quantity and quality need to produce one unit of "health", the estimations in the case studies were based on the implicit assumption that units of service rendered by a health worker (i.e. in case study 1, the G.P.) contribute to health and heance can be considered as an output of the health sector services.

resource estimates must be realistically made within the constraints of the country's ability to buy, borrow or produce resources. If the national planner finds: (1) that the country has only 10,000 graduates of primary schools projected as ready for entry into the general and technical secondary schools; (2) that the health planner has made his plans based on an estimate of 8,000 entrants into the health technical secondary schools while (3) heavy industry had estimated 8,000 entrants needed for its programmes; then the national planner must have then revise their estimates in the light of national priorities.

To avoid such conflicts, health manpower planners attempt to integrate their plan estimates with those of the educational sector and the goods producing sectors.

Ideally, there is a constant feedback from each sector as the sectoral plan estimates are shaped up in the light of the national objectives and sectoral objectives. But the simple example highlights the fact that estimations in health must take into account the following factors:

- (1) intra-industry requirements (e.g. estimates of need for doctors versus planner versus nurses versus sanitary engineers, etc; hospitals versus sanitation treatment plants versus health units, etc.)
- (2) inter-industry requirements, i.e., health planners must consider that other sectors are bidding for the same stock of resource capacity.

A useful planning technique in this respect is called input/output analysis. It is possible, using this technique, determine the level of gross production in different industries in order to meet a stipulated level and composition of final demand. The study of the intra and inter-

A final word is in order. Estimation for health manpower at present depends greatly on the judgement of health professionals rendering the services. Even in cases where resource estimations are based on a very detailed and minute analysis of each disease entity (e.g. CENDES) and even when the computer is used to solve the problems of calculation of such minute analyses, in the final analysis the estimations are only as good as the professional judgements on which they are founded.

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- 9? This was found to be the case in the USA for example, when coverage was extended to the various therapy services under Medicare (a health insurance scheme for the aged).
- 9(a) El Mofty, Samir N. Fathi. The Demand for Medical care: A Human Capital Approach (unpublished Masters thesis) Illinois: University of Illinois at Urbana-Champaign 1972.

10. It should be noted that only a certain percentage of a country population can be considered as the actual labour force. In Egypt, for example, there are 35 million people, 8 million of whom constitute the civilian labour force. Of these 8 million, only 6% belong to the category of the critically needed technical, professional and managerial personnel. The health sector has to compete for these scarce resources with other sectors where their productivity, if used, could be proved to be higher.
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12. Blum, op. cit. P. 17.01
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14. Hatry, Harry P. "Measuring the Effectiveness of Non-defense Public Programmes" OPERATIONS RESEARCH. Vol. 18, 5 (September-October 1970). P. 772.
15. Ibid, P. 774
16. In Egypt there are problems of availability and reliability of statistical data as is the case in most countries. In the case studies, the Ministry of Health data was used and assumed to be workably reliable.

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