

THE TAIWAN OR "ECONOMIC APPROACH" TO PLANNING

In describing this approach to planning we shall take it that the essential question asked is: "What health services are people willing to pay for?" The development of this approach has taken place largely under the auspices of Johns Hopkins School of Public Health and Baker and Perlman's work in Taiwan as described in their recently published (1967) book will be used as basis for the description.

The conceptual framework of the study falls in six parts:

- (1) qualitative and quantitative analysis of the supply of health workers;
- (2) projection of this supply to the future;
- (3) analysis of current public and private sector demands for health services;
- (4) projection of these demands;
- (5) trial balance of supply and demand;
- (6) corrective measures for any imbalances.

It will be seen from this that the first part involves measuring the current supply and qualifications of all types of health workers in some detail. The projection of this supply to target dates ten and twenty years hence involves analyzing the factors influencing fluctuation in this supply, such as increases by new graduates and losses by retirement, change of profession, migration, and death.

In the demand analysis - and Baker and Perlman are speaking about the current economic demand, both private and public sector must be considered. Baker defines "the present public sector demand" as the number of health professionals, at all levels, employed by government services. The authors point out that "it does not include budgeted vacancies, for these indicate that the public sector is unable to meet the estimated need by providing adequate salaries".

"The present private sector" is defined as basically the number of professionals (full-time equivalents) supported by the private sector.

The projection of this economic demand forward to ten and twenty years target dates must take into consideration at least five factors of social dynamics:

- (1) growth of population;
- (2) changes in age composition;
- (3) increase in per capita income;
- (4) improvements in educational levels;
- (5) urbanization.

The changing characteristics of a population, the authors point out, will influence the categories of health workers demanded. It is also pointed out that there are changes affecting medical care demands, such as institutional change and political change, which defy successful measurement. Changes in technology and variation in disease patterns cannot even be predicted and the effects of these changes can therefore not be taken into account in health manpower planning.

Having established the projected supplies and demands by successive years for the plan period the next step in this approach is to make a trial balance in order to determine what differences exist between predicted supply of health professionals and predicted demand for their services.

The final step is to propose practical solutions for any imbalances.

After this summary description of the essential steps of this approach a number of aspects will, still following Baker and Perlman's text, be discussed in a little more detail.

Economy of the health sector in Taiwan: It is not the intention to discuss the particular Taiwan situation in great detail in the following, but as Taiwan is being used as a specific example of this "Economic Approach" certain features of the Taiwan situation must be explained.

Health expenditures of the private sector are by far greater than those of the public sector. Government health expenditures are less than one-tenth of private expenditures. Taiwan therefore is much more similar to the free enterprise system of the United States of America than to socialized systems of medical care. Baker and Perlman's household survey showed that 7.5 per cent. of household expenditure went for "health".

Baker and Perlman found it extremely difficult to analyze the economic aspects of the public sector of the health industry as there are no official figures published on central government expenditures. The figures given for total budgets in two official surveys - the Ten Year Health Plan and the Statistical Abstracts are quite different.

I. The Supply Analysis

The details will have to be sought in Baker and Perlman's interesting book. They point out that the first step is to decide who to count. In Taiwan herbalists were sufficiently important to be included. The categories of health workers must be defined, and may differ considerably from country to country.

Among sources of supply information for most professional health workers are:

- (1) Training institutions
- (2) Licensing institutions
- (3) Professional registries
- (4) Special registration for permission to use narcotics
- (5) Lists of health workers paying a professional tax
- (6) Professional societies
- (7) Census data
- (8) Pharmaceutical Companies' lists of practitioners
- (9) Special surveys

It is necessary, as far as possible, to get a breakdown for age, sex, income, type of practice, geographic location, educational background, and specialization.

II. Projection of Supply

It will be evident that changes in supply may be either losses or increases.

Losses: These may be from (a) death; (b) retirement; or (c) by migration.

Increases: The only normal sources for new health professionals are from the country's educational and training facilities. However, in some countries expatriate staff, immigrants and temporary interns are of importance in the manpower study, although difficult to evaluate.

Baker, in a paper on Health Manpower Planning, has analyzed the four basic factors that determine a country's potential for increasing its numbers of trained health professionals:

- (1) The raw material, i.e. the qualified applicants for training.
- (2) The educational plant capacity.
- (3) Capital, i.e. funds available for expanding training facilities and for recurring costs of training and education.
- (4) Availability of teachers.

III. Demand Analysis

There are a number of different approaches to demand analysis. The Johns Hopkins have spoken about what they call the biological, the economic, the normative and the functional analysis. The Taiwan methodology is based on measurement of effective economic demand. This approach is particularly well adapted to countries where the private sector is an important factor in the financing of health services. The difficulty of this approach is that it makes it practically indispensable to undertake a rather ample survey of patterns of demand for health services throughout the country to be studied. The demand must be quantified by basic demographic attributes of the population.

In Taiwan, as already mentioned, the private sector serves a substantial part of the population and the demand for services is controlled by "market" mechanisms. It was decided to interview a sample of the total population and a sample design was prepared with the sample being run at monthly intervals for a period of one year (for details the reader is referred to Baker and Feriman's book).

A questionnaire was prepared which was intended to answer four principal questions:

- (1) Do increases in economic level result in increased use of physicians?
- (2) Will widespread public education increase the demand for physicians' services?
- (3) Does urbanization raise the demand for physician care?
- (4) Do the old and the young make more demands on physicians than middle-aged groups?

The majority of questions on the sample survey dealt with those four subjects: (1) a series of questions dealing with the household economic level; (2) questions on the education of all adults (over fifteen) in the household; (3) the respondents were already classified by place of residence; (4) age of all persons were determined by a question on year of birth; (5) the final, essential group of questions dealt with the demand for, and cost of, medical services.

In addition to the above principal areas of inquiry, subsidiary questions covered topics such as type of water supply and sewerage disposal. Also "the distance, by usual means of travel" to the nearest physician, pharmacist, hospital, etc.

Baker and Perlman had had considerable discussion on the wisdom of including questions on morbidity. They felt that if credence were to be given such data they would have to be backed up by medical, post, i.e. physician and laboratory examinations. They did, however, using public health nurses as interviewers, include one question on morbidity: "What were your illnesses these past months?"

An "opinion" question on quality of service was dropped after the first month.

It is worth mentioning that a special training course was set up for interviewer orientation and the first month's survey was regarded as a practice month and the data discarded.

The above rather scanty details have been given in order to make it quite clear that a sample survey like this Taiwan one - involving sixty-six thousand interviews is a very major, difficult and expensive undertaking not to be entered into lightly.

The biological basis of demand for medical care

While agreeing that the determination of the basic biological need would be the most scientific approach Baker and Perlman find that this is unworkable. They describe the famous attempt of the Lee and Jones' report¹ as based on:

¹ Lee, R.I & Jones, L.W., The Fundamentals of Good Medical Care. Chicago: University of Chicago Press, 1955.

- (1) determining the level of mortality and morbidity of a country;
- (2) estimating the time of health professionals needed to care for the average case of each type of illness;
- (3) multiplying the estimated time per case by the estimated annual number of cases to get the total professional hours needed;
- (4) determining the average hours worked per year by the professionals;
- (5) dividing total hours needed by hours per professional to determine total required supply of health professionals to meet basic biological needs.

Baker and Perlman point out - no doubt correctly - that there is no country in the world with sufficiently detailed and accurate morbidity and mortality statistics to give the exact figures needed for this type of estimate. It will be evident to the reader that the methodology developed in Latin America represents a modification of this approach.²

Baker and Perlman do, however, agree that "for clear understanding of health manpower analysis familiarity with the major disease patterns of a nation is essential." They got their data from official sources but this part of their "methodology" is very likely the weakest; it will be remembered that, in the survey, only one question dealt with morbidity. Morbidity data were largely obtained through this one question asked the 66,000 interviewees "Were you sick last month?" If the person had been sick he was asked for the number of days lost from his usual activity, medical services used for the illness and the cost of these medical services.

IV. Projection of Demand

The basic idea of the Hopkins workers was to develop a method of analysis which would enable developing nations to understand and meet their manpower problem. In the demand projection for Taiwan it was necessary to deal separately with the private and the public sector.

²Health Planning. Problems of Concept and Method, Pan American Health Organization, 1955.

A. The private sector

Baker and Perlman analyze the effect of economic and demographic attributes of the population on utilization of doctors in private practice. The factors include economic level (adjusted for family size); age, education, degree of urbanization, morbidity and sex. It is the contention of the authors that if this kind of information can be acquired for a number of countries, in differing levels of economic development, generalizations about the impact of demographic and economic transitions on the demand for medical services can be developed. Such generalizations could furnish a basis for making projections for changes in demands for health services.

Changes in demand occasioned by total population increases are fairly obvious. What Baker and Perlman are attempting is to develop a methodology based on the study of the varying demands associated with a variety of socio-economic population components. Changes in demand for doctors occasioned by shifts in population composition are much harder to predict than those due to simple population increases. If the population becomes better educated, just what effect will that shift have on the demand for physicians? What will be the impact of changes in age composition, changes in urban-rural location, improvements in economic levels, and even changes in sex ratios?

methodology

To make the projections four types of information are needed:

- (1) the present total number of "full-time equivalent" private practitioners (i.e. all doctors in full-time practice plus one half of all colored doctors);
- (2) the average visits per doctor per month;
- (3) the present rates of doctor visits per capita for the various population components;
- (4) population projection, by components, for the target years.

We then multiply average visits per person per month for each population component, times the projected population for that component, and add the products. The result is the total visits per month for the future total population (this sum will differ from the over-all average rate of present visits times the total future population, because of changes in population composition).

The average number of visits per physician is divided into the total future demand for physician visits to give the total number of physicians needed. (The number of visits per doctor per month may have to be modified in order to maintain physicians' real earnings or improve standards of care in the future.)

$$\text{Doctor demand} = \frac{P_1(1973) \times V_1(1963) + P_2(1973) \times V_2(1963) \dots + P_n(1973) \times V_n(1963)}{R}$$

$P_1(1973)$ = Projected population of component 1 in 1973

$V_1(1963)$ = Visits/physician/month in component 1 in 1963

R = Number of patients seen by doctor in a month

n = Number of population components

This description is of necessity very condensed and interested persons will have to consult the monograph. The major problems in this method of projection are called to attention by the authors. First, major social or technological changes might affect both the rates at which doctors see patients (productivity) and the rates at which people visit doctors (utilization). Second, the hazards of using cross-sectional analysis for long-term purposes. The authors consider that despite its limitations, the disaggregated approach is better than the simple enumeration of cities and the projections stemming from them.

There were then two reasons for undertaking the above multivariable analysis of the various demographic variables on the demand for physician services: (1) the interest in classifying and understanding the effects of demographic characteristics on doctor demand in a developing nation; and (2) as the number of components in the projection increases, problems in the determination of future population components multiply. The writers therefore sought to determine the feasibility of dropping one or more of the variables, if any proved to be unimportant in determining future demand.

Unfortunately, associations among variables may exist to hamper the evaluation of the influence of each. Such associations take two forms, usually described as correlations and interactions. The correlations arise from peculiarities in the distribution of observations. If, for example, urban

areas tend to have relatively large numbers of high-income residents, it would not be clear & definitely whether observed rates of doctor usage resulted from conditions of urban living or from the income differential. Indeed the two areas could act in opposite directions, thus obscuring the real influence of each. In any event, the facts call for research if not for action to reduce the projected impact of economic improvements in these areas.

Discussion: One starts with the influence of place or location of variables in which the effect that would be a disintegration of living conditions variable separately. High income and urban variables might be expected to produce a synergistic effect on medical usage rates higher than the sum of the individual effects.

To deal with this problem the authors utilized the technique of multiple regression analysis (see equation and the appendix). The results may be summarized as follows:

Age: All studies seem to suggest that the elderly (over 45 years of age) use more physicians more frequently than anybody else. They also suggest that the very young (those less than 4 years of age) use physicians much less frequently. Children between 4 and 15 use the physicians third most frequently and "everybody else", i.e. those between 15 and 45, use physicians least frequently.

Sex: The authors were surprised to find little difference in the use of physicians by sex.

Education: The income data showed that education, either in urban or rural areas, was not an important indicator of the use of physicians.

Health: The working use physicians more frequently than the poor. Although finding less difference between groups than the variable of age, it is still of considerable importance and one can expect a few deaths in population from the low-income groups to the high-income groups over the next twenty years.

Summary: The authors found to their surprise that education did not appear to be important in the doctor market of rates of doctor usage in urban.

It must of course be kept in mind that while the above changes of demand can be predicted with some degree of accuracy certain other factors, which may be very important in changing the pattern of demand, are virtually unpredictable. These factors are changes of disease patterns, technological changes, and social and organizational changes.

B. Public sector demand

Baker and Post have used the United Five-Year Health Plan to project the demands for health professionals for the future projecting separately the five public sector institutions that use health professionals. They admitted that "we do not have adequate data to determine the degree to which increasing economic level, education and urbanization will affect the people's demands on their government for more and better health care. We believe the effect of these factors will be to increase demands for public sector medical workers well above any estimates".

Conclusions. It will be clear that the principal advantage of the described approach to demand analysis lies in that it is realistic. The fundamental assumption is that each stratum of society will continue to demand essentially the same volume of services per capita at a future date as it did in the base year. The English workers point out that since analysis is based on the services actually consumed, the risk of setting excessively expensive or otherwise unrealistic objectives is avoided.

The limitations to the use of this approach are, however, as admitted by the authors, serious. It demands a costly survey and good baseline population data. None important, it is quite unreliable in countries where major changes in allocation of resources will be needed. It is further not suitable in countries with a dominant private sector, and its use is, therefore, very limited for most underdeveloped countries, where certainly the use of the multivariate analysis and component population projection must give way to more simplified methods. It will be of interest to see Hall's³ forthcoming manuscript on Peru, where the private sector is almost exclusively concentrated

³ Hall, P. L., Peru, Health Resources Planning, Baltimore, Johns Hopkins Press, 1958.

in large cities. Fein,⁴ in his recent study of the doctor shortage in the United States of America, found that the data were insufficient to permit analysis of the interaction between the various demand variables, which he therefore considers each in isolation.

⁴ Fein, R., The Doctor Shortage: An Economic Diagnosis, Washington, D.C. Brookings Institution, 1967.