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A HEALTH MANPOWER PLANNING MODEL FOR OIL-RICH DEVELOPING NATIONS

by

Dr. Basu Ghosh*

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INDIAN INSTITUTE OF MANAGEMENT
BANGALORE

**Professor, Indian Institute of Management Bangalore*

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ABSTRACT

Health manpower planning is a key component of health sector planning. It is crucially important for countries with scarce indigenous human resources, such as the oil-rich developing countries in the middle east. Most of these countries have adopted a policy of indigenisation. Health manpower planning models have evolved over the years, and the concepts and principles of these are generally applicable to any country. However, in view of the special characteristics and features of the oil-rich middle east countries, it is necessary to adapt and evolve a model with increased applicability to such settings.

This paper presents an integrated computer-based model (already successfully implemented in an oil-rich country), which enables simulation of alternative human resources and health system infrastructural strategies.

INTRODUCTION

Human resources planning has long been recognised as a key component of health sector planning. A symposium organised by the WHO Regional Office for Europe in 1968 at Budapest, for reviewing the 'methods of estimating health manpower', summarised the rationale for health manpower planning as emerging from a number of observations(1):

- the danger of leaving 'manpower supply to the mercy of a free market' where the State plays an increasing role in the health sector,
- forecasted manpower shortages in several European countries,
- the fact that 'the health sector can only work with the resources society chooses to give it',

- long gestation lag in health manpower production, and

- accelerated pace of development and health care.

Proper health manpower planning, according to one of the first formal publications of WHO-HQ on the subject, can prevent several anomalies(2):

- non-utilisation of an expensive hospital built on borrowed funds, due to shortage of nurses,

- loss of trained manpower due to failure in creating the jobs on time,

- loss of qualified manpower to other countries,

- health care deprivation of rural areas on the pretext of equity,

- shortage of funds for drugs and equipment in an overstaffed health facility, etc.

A comprehensive health manpower study conducted in Taiwan in 1967 pointed out, inter alia, "the problems in health manpower that will develop over the next two decades if changes are not made in the present system"(3). The study noted great imbalance in the field of nursing and an emerging serious problem of doctors shortage(3). Another pioneering study brought to focus the problem of "marked concentration of professional health personnel in the urban areas" in Peru(4). A study conducted by the Indian Institute of Management, Bangalore, using an innovative methodology for speciality health manpower planning, revealed excess availability of specialists (37-38%) in Karnataka (1984), and advocated selective pruning of intakes in different medical speciality programmes(5). Another comprehensive study in Somalia noted deficit of health manpower (40%) on the one hand, and large surplus in the capital city(6).

Although many of these studies had broader scope than merely a "numbers game", the fact remains that "manpower planning has traditionally been carried out within a rather narrow mandate...that is with projecting and matching between the total number of health workers needed and their supply"(7). It follows that any human resources planning effort needs to go into both quantitative and qualitative aspects of the human resources system. While a planner has to strike an appropriate balance between these two dimensions,it is no doubt necessary to attempt perfection on each of these two dimensions. As this paper is focused more on the quantitative aspects, it is pertinent to discuss the rationale for a different forecasting model for the oil-rich middle east countries.

Most oil-rich middle east countries have a small stock of indigenous health manpower and a large share (40-80%) of expatriate manpower. Many of these countries have embarked upon massive infrastructural expansion programmes. And, they also have a proclaimed policy of indigenisation. The educational infrastructure for production of doctors, nurses etc., is ever expanding. But, increase in intake of students in these institutions cannot be effected unilaterally because of a small (but expanding) graduate base and many competing educational opportunities for them. As these countries have the means, many students are also deputed abroad for graduate or post-graduate education at the expense of the public exchequer. In view of all these facts, human resources planning for an oil-rich middle east country does require a somewhat different approach and planning model than those commonly adopted in most developing and developed countries.

REVIEW OF AVAILABLE MODELS

The WHO guidelines (7) on health manpower planning recommend ten steps to health manpower planning, of which the first five steps are:

(i) Preparation of a Health Manpower Situation Report,

(ii) Projection of Future Supply of Manpower,

(iii) Projection of Future Manpower Requirements - quantity, quality and distribution,

(iv) Identification of Mis-matches between supply and Requirements, and

(v) Solving mis-matches.

Information on current supply is assembled and the likely increments and losses in the next few years are estimated. Using either the 'census method' or the 'cohort method', future losses of manpower are estimated. Similarly, the future gains of manpower may be estimated on the assumption that the present trend in manpower production and other sources of gains will continue. Alternative sets of supply projections are made under varying assumptions regarding sources of manpower gains. Possible considerations include: increase of intake (output) in schools/colleges, improvement in salaries and other working conditions, increase in immigration or reduction in out-migration of health professionals.

Health manpower requirements are estimated using the 'health needs', 'health demands', 'service targets' methods, or simply by using 'manpower/population ratios'. These methods are believed to be 'a series of overlapping methods

on a continuum that starts with meeting professionally determined needs for health care and ends with meeting demands and wants'. Alternative projections of manpower requirements are made depending on different sets of assumptions about health needs/demands or manpower/population ratios etc.

The next steps in the analysis consist of assessing category-wise quantitative mis-matches (surplus or shortage), and identifying actions for reducing the mismatches. This requires the planner to identify the 'constraints, obstacles and consequences' of the actions envisaged, and to come up with clear recommendations for action.

It is observed from a more recent document on health personnel projections, released by WHO-HQ, that no major development has taken place in health manpower planning models since the publication of WHO guidelines (8). This publication further distinguishes two types of models for supply projections: 'trend method' and 'stock and flow method'. It suggests that, where the government stance is passive the trend method is more appropriate for supply projection. In such a situation the 'health demand' method is more appropriate for projecting health personnel requirements. Where the government stance is active the 'stock and flow method' of supply projection, coupled with the 'service targets' approach for projection of manpower requirements, are more appropriate.

Health planners have from time to time, adopted different variations of the above approaches. For example, in the Somali health manpower study(9) the author developed and used a model, which involved the following steps:

- estimation of stock of health manpower using a survey of manpower,

- estimation of demographic profile of staff using personnel files,

- projection of future requirement of health manower under alternative assumption about manpower/population ratios (considering the situations in other better-developed countries in the region),

- projection of future availability of health manpower using a combination of life table and attrition rates (estimated using personnel file data), and under varying assumptions about educational outputs, and finally,

- recommending target manpower production levels based on estimation of likely mismatches between projected levels of manpower supply and requirement.

A model was developed in India, especially for projecting requirements of medical specialists in various specialities, based on projected changes in morbidity patterns and sharing of case loads by different specialities, demographic adjustments etc.(10). An 'Indicator of Staffing Need System' was evolved in Botswana for calculating the requirement of health manpower in different categories(16). Several other studies in India have been undertaken using the models elucidated earlier, and using alternative data based on the manpower availability(11,12,13).

ADDITIONAL FEATURES REQUIRED

In view of the special situations prevalent in the oil-rich middle east countries, the conventional models of health manpower planning need some adaptations:

Supply Side

(i) Deal separately with two streams of manpower viz., nationals and expatriates,

(ii) Recognise the differences in loss rates of manpower in each of these broad groups,

(iii) Build the manpower indigenisation policy as an integral part of the model.

Demand Side

(iv) Ensure the availability of eligible graduates as inputs into higher educational institutions, while recommending increase in intake sizes,

(v) Consider the continuing expansion schemes, where applicable, and the likely requirement of manpower consequent to these, and seek to balance it against the indigenisation goals,

(vi) Assess the productivity of manpower and develop or refine the staffing norms for hospitals/health centres,

Integration of Supply and Demand Factors

(vii) Develop an integrated model and computerise it, so as to update it and reprogramme it periodically - to keep pace with the fast pace of development in the oil-rich middle east countries.

THE PLANNING MODEL

Assume that the country 'X' wishes to prepare a health manpower development plan for the period Y_1 to Y_5. Health manpower availability during the years Y_1 - Y_5 will be determined mostly by past decisions regarding intakes in the Faculties of Medicine and Schools of Health Sciences, as well as deputation of national students for education abroad. Intake decisions at the Schools of Health Sciences during the first 2 years of the current plan period will also influence manpower availability towards the end of the plan period. How many of the staff in a category will continue to remain in the stock in future years, and additional future requirements of staff necessitated by expansion of the health system infrastructure or extension of the scope, scale or quality of the services will influence decisions on future recruitment of personnel in various categories. The model attempts to project recruitment of expatriate and national staff in the future, and also to study the likely levels of indigenisation that this will entail.

Let N(i) = Number of Nationals in a certain category in the ith year of the plan period.
E(i) = Number of Expatriate staff in the same category in year (i)
LN(i) = Number of National staff in the category lost during year (i)
LE(i) = Number of Expatriate staff in the category lost during year (i)
LT(i) = Total number of staff in the category lost during year (i)
R(i) = Additional requirement of staff in the category in year (i)
P(i) = Net production of National graduates (available to MOH) in year (i)
AN(i) = Number of National appointments in the category in year (i)
AE(i) = Number of Expatriate appointments in the category in year (i)
AT(i) = Total number of appointments in the category in the year (i)

From the above it follows that:

$$LT(i) = LN(i) + LE(i) \quad \ldots\ldots(1)$$

$$AT(i) = AN(i) + AE(i) \quad \ldots\ldots(2)$$

for all i = 1,2....10

Since all graduating Nationals are expected to be appointed, it follows also that

$$AN(i) = P(i) \quad .....(3)$$
for all $i = 1,2 \ldots 10$.

Let $l(N)$ = annual attrition rate for Nationals in the category. (assumed constant during the period)

$l(E)$ = annual attrition rate for expatriates in the category. (assumed constant during the period).

Then $LN(i) = N(i).l(N)$ .....(4)
$LE(i) = E(i).l(E)$ .....(5)

Hence $LT(i) = N(i).l(N) + E(i).\ l(E)$ .....(6)

It follows that $AT(i) = LT(i) + R(i)$ .....(7)
Since $AN(i) = P(i)$ as per (3)
And $AE(i) = AT(i) - AN(i)$ from (2)

Therefore $AE(i) = AT(i) - P(i)$ .....(8)

Hence the stock of National manpower in the next period (i+1) will be:

$$N(i+1) = N(i) - LN(i) + AN(i)$$
$$= N(i) - N(i).\ l(N) + P(i)$$
$$= [1-l(N)].\ N(i) + P(i) \quad .....(9)$$

Using expression (8) it follows that
$$E(i+1) = E(i) - LE(i) + AE(i)$$
$$= [1-l(E)]\ E(i) + AT(i) - P(i) \quad .....(10)$$

Using the identities (9) and (10), the number of losses and appointments and next year's stock for Nationals and expatriates are successively computed for each year, for 5 or 10 years as required.

This model has been successfully applied for human resources planning in Oman (14,15).

STEPS IN THE PLANNING EXERCISE

The human resources planning exercise may set for itself the following tasks:

* to review the human resources situation in regard to the selected categories in terms of the stock, profile, distribution, etc.;

* to review health manpower production and assess further potentials for developing it;

* to project future availability and requirement of manpower, and recommend appropriate intake levels for the educational programmes;

* to project indigenisation levels for the categories under alternative scenarios, and

* to recommend a systematic programme in indigenisation through assessing the indigenisation potentials of every non-national employee in all the selected categories.

The manpower planning exercise may be undertaken using the following steps:

(i) **Decision on manpower categories for inclusion under the study**

(ii) **Decision of forms for data collection**

Forms are to be designed for collection of the following data:

* List of staff in the category with selected characteristics

* Profile of National students Currently Studying Abroad

* Data on Applicants to MOH Courses

* Data on Students

* Data on Academic Performance

* Data on Stock, Resignations/Terminations

* Data on Appointments

* Data on staff in the category working in MOH Institutions

* Information on Course Duration.

(iii) **Collection of Data**

The data on personnel and staff characteristics may be collected directly from the Regions, if a computerised personnel information system is not available. Data on personnel characteristics may need to be culled out of the personnel files maintained by the administration. Data gaps discovered in personnel files may be bridged by

personal/telephonic contact with the concerned employees. Considerable follow-ups are necessary to minimise the extent of missing information in the data base of the study.

The data on personnel quantity and characteristics can be transferred from the regional capitals to the national HQ, using the medium of hard copies (typed/hand-written), floppy diskettes and/or E-mail.

Data on educational particulars, in the formats required for the study may be collected from the directorate of education/ training, which may undertake the necessary data analysis to generate the information required for the study.

Data on recruitment and loss of personnel can be collected from the department of personnel.

(iv) **Analysis of data**

The data analysis may be undertaken on the computer using standard software packages, viz., Excel Version 4.0 thus minimising secretarial work and the chances of computational or typographic errors, and maximising the flexibility in analysis.

(v) **Projection of Future Manpower Availability and Requirement**

For purposes of forecasting the future manpower situation, the planning model is utilised.

Future availability of manpower is determined by:

(a) Survival of the employees in the existing stock of manpower to future years;

(b) production of new national graduates in the respective fields over the years, and

(c) recruitment of new employees. For purposes of estimating the future survival, attrition rates (defined as percent of manpower in stock on 1st January, lost during the one year period ending 31st December) are to be estimated using the relevant data collected from the administration. For assessing the likely production of national graduates, the data on current students in the respective courses are considered. In this context, the data on applications to various courses from every region are analysed to compute the success rates in securing admission and the region-wise shares in applications and admissions. The study may examine various scenarios on manpower production (i.e. alternative intake sizes: same as at present, increased or decreased) to evaluate its impact on the manpower situation and indigenisation. While considering options for increasing the intake sizes, it is imperative to ensure the

availability of enough applicants to a course and the quality of students admitted. Available data on forecasts of the numbers of secondary students, who are likely to graduate over the years, are used in conjunction with the data on number of applicants to a particular course, to derive an estimate of the expected numbers of applicants. Assuming that as a measure of quality assurance, the Ministry may wish to maintain the same 'ratio' of applicants to successful candidates, an attempt may be made to project the expected number of successful candidates. This expected figure may be termed 'potential intake', regarded as some kind of an upper bound to the size of intake to a specific educational programme. Recruitment of new employees is governed by two factors, viz., loss of existing manpower and the future requirement of manpower - which is discussed in the following section.

Future additional requirement of manpower (in addition to the replacement needs owing to loss of existing manpower) is primarily necessitated by the expansion or upgradation of the health system infrastructure and/or growth in population. Certain developmental projects may be under implementation, as part of the present or previous health development plans. These projects are likely to be at various stages of completion, and will imply new manpower needs accordingly. In order to be able to anticipate future manpower needs beyond (say) 1995,i.e. the end of the present plan period, it is necessary to think ahead about the projects likely to be commissioned in the next 5 year health development plan. The Ministry of Health has to consider this need and identify a list of development projects. The projects have to be prioritised (as Priority I, II & III), and a tentative time schedule to be chalked out. The planner acknowledges the possibility of pruning of this list in the future because of likely financial crunch, and estimated future manpower requirement under 3 alternative scenarios: (i) Only Priority I projects are implemented in the next Plan, (ii) Only Priority I & II projects are implemented in the Plan, and (iii) All the listed projects are implemented in the Plan. For estimating the future manpower requirements in different types of health institutions, one needs to have certain staffing patterns as models for future manning decisions.

For this purpose, it is necessary to develop staffing norms considering current staffing levels in various institutions, the recommended staffing norms in different studies as well as further discussions with the policy makers. These staffing norms are to be used, in conjunction with the information on current availability, for assessing the additional requirement of staff in various health institutions.

Information on future population sizes in various regions is required as an input for some of the projection exercises. For this purpose population projections may be made using an assumed growth rate.

The future manpower situation up to the Year (say) 2004 may be projected, using the planning model, under combinations of alternative manpower production scenarios and health system infrastructure scenarios. Indigenisation

levels may be estimated under different sets of scenarios for arriving at recommendations on intake sizes for the educational programmes.

(vi) **Assessment of Indigenisation Potential of Non-National staff**

A confidential scoring system may be evolved for estimating the Indigenisation Potential Scores for all the expatriate employees, a graded list of staff may be generated and used as an input to decision-making for systematic replacement of the expatriate staff.

STRATEGIC HUMAN RESOURCES PLANNING

Easy updating and the possibility of simulating the outcomes of alternative scenarios on (a) Health System Infrastructure and (b) Health Manpower Production are two of the key features of the manpower planning model presented in this paper.

A table such as shown in the illustration is generated by the model for each category, on a P.C. using Excel 4.0 version. Once a tabular format, as in the illustration, is generated, one needs only to change the parameters of the model (shown in dark or bold figures):

(i) the initial stock (Nationals and Expatriates),

(ii) the attrition rates (separately for Nationals and Expatriates),

(iii) the additional requirement of manpower (as follows from the Health System Infrastructure Scenario under consideration), and

(iv) the expected new appointments of nationals (as implied by the health manpower production scenario under consideration).

Once the values of the parameters are entered, the tabular values (lighter figures) change automatically to indicate the changes in the forecasts and all other related information. This feature of the model makes it a very

ILLUSTRATION : CASE OF LABORATORY TECHNICIANS IN COUNTRY XYZ

PROJECTED MANPOWER SITUATION 1994-2004

Category: Laboratory Technicians

Year	Stock on 1st January				Expected Loss			Addi-tional Require-ment	Expected New Appointments		
	N	E	Total	%N	N	E	Total		N	E	Total
1993	**121**	**355**	476	25.42	2	28	30	**18**	**25**	23	48
1994	144	350	494	29.15	3	28	31	**49**	**15**	65	80
1995	156	387	543	28.73	3	31	34	**104**	**16**	122	138
1996	169	478	647	26.12	3	38	41	**36**	**41**	36	77
1997	206	475	681	30.25	4	38	42	**47**	**22**	67	89
1998	224	504	728	30.77	4	40	44	**19**	**20**	43	63
1999	240	507	747	32.13	5	41	46	**39**	**20**	65	85
2000	255	532	787	32.40	5	43	48	**2**	**20**	30	50
2001	255	532	787	32.40	5	43	48	**32**	**20**	60	80
2002	270	549	819	32.97	5	44	49	**10**	**20**	39	59
2003	284	544	828	34.30	6	44	50	**0**	**20**	30	50
2004	299	531	830	36.02	6	42	48	**0**	**20**	28	48
	Attrition Rate				**0.02**		**0.08**				

Notes: The above proojections are based on assumptions as embodied in the following scenarios:
Health System Infrastructure Scenario1:
Only Priority1 projects are implemented in the Fifth Plan
Health Manpower Production Scenario1: Present intake level continues.

N: Nationals E: Expatriates %N : Percent Nationals

useful tool for strategic human resources planning. It enables the national health administration to balance indigenisation targets and health system infrastructural expansion plans by opting for an affordable and feasible manpower production scenario.

CONCLUSION

Human resources planning is an important component of health sector planning. Its importance is even higher for countries, such as those in the oil-rich middle east region, which rely on imported manpower. There is political pressure on reducing dependence on the expatriate staff, but serious reluctance among the health administrators to indigenise the human resources for fear of its adverse impact on the quality of care; or the sheer difficulty to achieve indigenisation targets; because of the health system infrastructural expansion targets. Strategic human resources planning using the model presented here is one of the approaches available for tackling this common problem in the oil-rich middle east countries.

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