As mentioned earlier, the health manpower needs should emanate from the health service development; and they should be developed accordingly. This suggests that the process of identification of needs for manpower and the process of development should go together in a setting where manpower situation shows no imbalances. But in reality the supply process often functions independently as the decisions with regard to the opening of educational/training institutions and the admission levels therein are often influenced by other factors than needs of health services. Not only this, all those who graduate are often not always available for work. A sizeable proportion of them remain out of labour force for a variety of reasons.

In view of the above, it is essential to know, what the term 'supply' means in manpower terminology? How it can be measured and what is its relevance in the context of an exercise on manpower assessment? This chapter attempts to discuss briefly the various terms used in this context and then proceeds on to discuss the measurement of supply in terms of "educational" and "occupational" categories, dynamics of supply flow etc. The chapter also discusses relationship between supply and demand, as the relationship, other than ideal, results in varied forms of manpower
imbalances. The forms of manpower imbalances are also mentioned in this chapter under various terms.

I. Concept and Definition of Supply

The term "stock/supply" refers to the availability of manpower with specific skill at a point of time. Though these two terms are often used as synonymous, yet there exists a distinction between the two. The word "stock" refers the total number of persons in a relevant category who are alive at a point of time. It covers both 'workers' and 'non-workers'; whereas the term "supply" is used in economic sense and denotes "labour force". There are other various terms used in the context e.g. potential supply, effective stock and working stock etc. These need to be clearly defined.

The term "Manpower" is, in fact an economic resource. It is that part of population which contributes or can contribute at an appropriate time or in appropriate circumstances to the production of goods and services. The total population minus persons too old and too young to work and the disabled persons forms "Manpower".

Manpower falls into two parts a) Manpower Supply and b) Manpower Potential. The economically active population i.e. employed and unemployed, constitute the manpower supply or labour force. Manpower minus manpower supply is manpower potential. It includes students, house workers and persons who are voluntarily out of labour force.
The word "stock", on the other hand, is a very general term. It refers to the "total number". It can be affixed with any word and thereby forms various terms such as "Working Stock", "Labour Force Stock" etc. The "Total Stock" when classified by activity status covers employed, unemployed, students, house workers, persons voluntarily out of labour force, retired, disabled persons and others. "Working Stock", "Effective Stock" and "Labour Force Stock", are thus the components of total stock. The term "Effective Stock" generally used as synonymous to "Manpower".

In the present exercise on supply estimation, the following grouping/classification is adopted by breaking the total stock into four components (i) currently working (ii) currently available for work (iii) currently not available but physically capable of engaging in work and (iv) currently not available and also physically incapable to undertake work.

Chart I indicates the relationship between (a) the usual 'activity status classification'; (b) grouping adopted for the present exercise and (c) supply/stock terms defined. It may be noted that the term 'Manpower Supply', 'Active Supply' and 'Labour Force Stock' are often used as synonyms.
CHART I
RELATIONSHIP BETWEEN ACTIVITY CLASSIFICATION & SUPPLY/STOCK TERMS

Activity - classification
\[\downarrow\]
Classification adopted for Supply Analysis
\[\downarrow\]
The 'terms' stock/supply as defined

Workers
\[\downarrow\]
Currently working
\[\downarrow\]
Manpower Supply
Active Supply
LF Supply

- Unemployed
\[\downarrow\]
Currently Available for work
\[\downarrow\]
Manpower Potential or Potential Supply

Students
\[\downarrow\]
Currently not available for work but physically capable

Housewives
\[\downarrow\]
Neither currently available nor physically capable

Voluntarily out of LF
\[\downarrow\]
Total Stock minus Effective Stock

Retired
\[\downarrow\]
Disabled
\[\downarrow\]
Others (Disabled)

Manpower Potential or Potential Supply
Classification of Supply in terms of

'Education' & 'Occupational' Categories

Conceptually, manpower supply can be classified in terms of two different dimensions -- one based on 'Work' or 'Occupation' criterion and the other on 'Educational' criterion.

From the educational/training angle, the supply is determined in terms of the 'educational level'; that is to say what is the pool of the persons with a particular level of educational attainment? How many are graduating from the training institutions and how many of them are entering the labour market? What will be the likely supply of these qualified persons in the future? Will it be adequate to meet the requirements? On the other hand, the 'demand analysis' highlights the type of health services required by the society specifying the tasks/jobs to be performed by the requisite trained manpower. Thus the total number of posts/jobs in a particular occupation is determined to judge whether the requisite number of persons with requisite skill are available or not in the labour market to fill up these positions. This, in fact, indicates the current demand. The number of posts currently filled up or the persons employed is 'supply' in terms of 'Occupational' category.

The supply measured in terms of educational categories refers to the total stock of qualified persons who have

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acquired the skill through formal educational/training system. On the basis of activity classification the total stock can be bifurcated into 'Working Stock', 'Labour Force Stock' and 'Effective Stock'. The 'Working Stock' from educational angle includes all qualified persons whether working in their own occupation or in occupations other than their own for which they obtained the relevant degree/diploma. On the other hand, the 'supply' based on 'occupational' criterion covers all those who are working at a point of time in a particular occupation. Thus, it also includes the so called 'practicals' who perform the appropriate occupational functions without necessarily having formal educational qualification relevant to that occupation.

This distinction between the two is clearly depicted in Chart II.

II. Dynamics of Supply Flow

There is a continuous movement into and out of 'supply pool' affecting change in its size and composition. How and in what manner the change is taking place? What is the source of entrants to the pool of current supply and what are the reasons for leaving? What is the final destination of leavers? At what rate is the change taking place? An overview of the entire supply flow process is desirable before embarking on the exercise of measuring the different elements of flow.
CHART II

RELATIONSHIP BETWEEN STOCK DEFINED IN TERMS
OF 'EDUCATIONAL CATEGORY' VIS-A-VIS
' OCCUPATIONAL CATEGORY

SUPPLY PROCESS → Education & Training (Linkages) → Employment → DEMAND PROCESS

Stock in terms of educational category
Workers in other occupations
Workers in the same occupation for which trained
Unemployed

Out of labour force, components

Stock in terms of occupational category
Posts filled by qualified persons
Posts filled by Practicals
Unfilled posts

Posts/ Jobs as per demand
New graduates from the training institutions are the main entrants to the 'pool of current supply' which is built up by accumulation of outturns of different cohort years over a period of time. The flow of new graduates is in all directions i.e. entering the 'supply pool', 'joining other occupations', 'emigrating to other countries', 'going for higher studies' and 'remaining out of labour force'. Thus accumulated over a period of time, they constitute different categories of stock viz., 'Working Stock', 'Labour Force Stock', 'Out of Labour Force Stock', 'Stock of Qualified Persons in Other Countries' etc. At a later stage, there is (in) and (out) movement from 'supply pool' to other categories of stock as well. The flow of entrants and leavers from the pool of current supply is indicated below:

<table>
<thead>
<tr>
<th>Entrants to the pool of Current Supply (In flow)</th>
<th>Leavers from the pool of Current Supply (Out flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- New graduates from training institution</td>
<td>- Death</td>
</tr>
<tr>
<td>- Transfer of persons from the stock of persons working in other occupations</td>
<td>- Transfer to the pool of stock of persons working in other occupations</td>
</tr>
<tr>
<td>- Immigration from the pool of stock of qualified persons in other countries</td>
<td>- Emigration to other other countries</td>
</tr>
<tr>
<td>- People returning to work from the pool of 'out of labour force 'component'.</td>
<td>- Persons joining the pool of 'out of labour force stock'.</td>
</tr>
</tbody>
</table>

An Overview of 'supply flow' is depicted in Chart III.

CHART III

SUPPLY FLOW

INFLOW

CATEGORY OF STOCK

OUTFLOW

NEW GRADUATES

Transfer from other occupations

Immigrants

Returning to work

CURRENT MANPOWER SUPPLY (LF STOCK)

OUT OF LABOUR FORCE

Stock in other countries

Stock in other occupations

DEATHS

To other occupations

Emigrants

going out of labour force

III. Methodology for Estimating Stock/Supply

Manpower supply is determined by estimating 'in-flows' and 'out flows' from the pool of current stock. As mentioned earlier, the figures for current stock are obtained from the existing data sources viz., Population Census, Indian Nursing Council and others. The estimated base year stock is then adjusted year by year to take into account the anticipated increments to and losses from the current supply.
to derive the projected supply. While conceptually simple, the practical task of obtaining the necessary information present many difficult problems particularly in respect of measurement of the factors pertaining to occupational mobility, inter-state migration and emigration. The methodological issues involved in estimating the (i) base years stock (ii) inflows and (iii) outflows, are briefly discussed below:-

**Estimating base year stock**

Estimation of figures of stock raises different type of issues depending upon concepts adopted. It should be specified at the very beginning whether these figures relate to 'working stock', 'labour force stock', 'effective stock or total stock' and its components. Further it should also be made clear whether the estimates are to be made in terms of 'occupational' or 'educational' categories. Estimates should, in fact, be expressed in identical terms and units. This is important in the context of developing appropriate methodology and collection of appropriate data relevant to the defined category.

The estimates for base year stock can be worked out by pooling together different sets of figures available from different sources duly analysing their frame and context. Usually the estimates, so available, differ from one another. Thus, there is a problem of reconciliation also. An attempt has to be made to sort out all these issues of
comparability by examining and evaluating the data and identifying the reasons of inconsistency. After giving due allowance for the gaps and limitations, a consistent set of figures for the base year stock can be worked out.

The estimates for the base year stock can also be worked out by 'Indirect Method'. Under this method, year-wise time series data on out-turn for the past years (say 40 years - the working span) are first compiled. These are then accumulated year to year giving due allowance for attrition (due to mortality & emigration) until the target year for which the estimation of stock is required. In this context, the information on average age of passing and the average age of retirement are required for determining the average working span. This base line stock would relate to 'total stock' and therefore has to be adjusted by applying appropriate labour force participation rates for getting the figure for 'supply' or 'labour force stock' to make it comparable with other sets of figures.

The two sets of estimates for the base year must be consistent and thereafter a final figure for the base year stock should be decided.

III. Method of Measuring Supply flow

The Flow Chart III indicates the main sources of increment to the 'manpower supply' and the reasons for losses. Measurement of likely number of entrants for each source and the number or percentage of losses for each reason presents
some problems particularly in regard to the availability of data. In most of the cases, the data are either not available or inadequate. However, an attempt has to be made to estimate the likely magnitude of total gain or loss on the basis of whatever data available.

Information on 'Source of increments' is, for most part readily available since new graduates from training institutions represent the largest single source of supply increments. But in respect of loses the data are very limited. In the absence of requisite data, approximations have to be made. Even for approximation, some basis is required for which fragmentary data whatever available from different sources have to be pooled (A Special ad hoc study may also be conducted, if need be.)

At this stage, a question arises whether it is worthwhile to work out estimates for each one of the reasons causing loss separately particularly in view of the fact that in most of the cases the number 'loosing' is very small which has very little effect on the total supply. As such, it is desirable to aggregate gain sources or loss groups i.e. in and out components together to arrive at net gain or loss. Moreover the objective of the present exercise is not to work out detailed and precise estimates of gain or loss for each source separately but to have a broad order of likely magnitudes of overall net gain or loss to the current supply pool. Disaggregated approach is however, preferred when adequate data are available otherwise aggregate ap-
Now we attempt and examine each source of gain or loss individually to see how they can be grouped for estimating the magnitude of total gain or loss. An overview is presented in the statement below.

**Aggregate Approach for determining the magnitude of total gain or loss**

<table>
<thead>
<tr>
<th>Source of Gain</th>
<th>Source of loss</th>
<th>Col.(1) - Col(2) resulting in net gain(+) / Loss(-)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. New Graduates (outturn)</td>
<td>..</td>
<td>+ net gain (Number is large &amp; significant)</td>
<td>Adequate data on outturns is available.</td>
</tr>
<tr>
<td>2. Deaths</td>
<td>(-)net loss (Number small but significant, due allowance to be given)</td>
<td>- Data on 'mortality rates are available from LIC (Mortality rates) and Census (Life Tables) - Estimates to be worked out.</td>
<td></td>
</tr>
<tr>
<td>3. Transfer from other occupations to other occupations</td>
<td>negligible</td>
<td>Occupational mobility among nurses seems to be restrictive and as such the number is very small. If transfers 'to' and 'from' are combined, the resultant net gain or loss will further be reduced &amp; would be negligible. This factor, therefore, can be ignored and not taken into computation.</td>
<td></td>
</tr>
</tbody>
</table>

-- contd..
<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emigration</td>
<td>Emigration</td>
<td>(-)net loss</td>
<td>Data not available.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Number significant)</td>
<td>Approximation has to be</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>made on the basis of fragmentary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>data available from studies</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>made by different organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>viz., IAMR etc.</td>
</tr>
<tr>
<td>Returning</td>
<td>Joining</td>
<td>(-)net Loss</td>
<td>- No information is</td>
</tr>
<tr>
<td>from 'out'</td>
<td>'out of'</td>
<td>(Number small but</td>
<td>available.</td>
</tr>
<tr>
<td>of labour</td>
<td>Labour</td>
<td>significant)</td>
<td>- No separate account</td>
</tr>
<tr>
<td>Force</td>
<td>Force</td>
<td></td>
<td>has to be taken for</td>
</tr>
<tr>
<td>Component</td>
<td>Component</td>
<td></td>
<td>this factor as it will</td>
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<td></td>
<td></td>
<td></td>
<td>be automatically covered</td>
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<td></td>
<td></td>
<td></td>
<td>while working out the</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>component of 'total</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>stock'. 'Labour Force Stock'</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>out of labour force stock' by</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>applying appropriate LFPR. It</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>may be noted that retirement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>is a part of 'out of LF' com-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ponent</td>
</tr>
<tr>
<td>Total new graduates</td>
<td>(Deaths)</td>
<td>(+)Outturn</td>
<td>- Data on outturns and attrition</td>
</tr>
<tr>
<td></td>
<td>(Emigration)</td>
<td>(-)Attrition due to</td>
<td>rates are required for measuring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mortality and</td>
<td>'Supply flows'.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emigration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The foregoing discussion spells out the various issues pertaining to the measurement of various components of inflows and outflows and comes out with an aggregative approach for determining the magnitude of total gain/loss. In the present context, the supply will be worked out on the basis of educational criterion; primarily through indirect
method but with due consistency check with the information available from other sources. The net addition to the stock will take note of only for those trained from formal training institution and as a losses to the available pool of stock, the factors on account of mortality and emigration will be taken into account. It may be mentioned that no exercise of this type should be taken as a finite one. The exercise of this nature has to be periodically taken up with the new data coming up at every stage maintaining due consistency with the previous exercise. In other words, these have to be 'rolling forecasts'. The estimates so provided are reflections of the broad order of the magnitude of likely supply at a future date and not the precise or exact figures.

IV. Analysis of current Supply - Significance & Implications

A comprehensive analysis of the existing supply situation in respect of its deployment and utilization is necessary for any exercise on manpower projections. Unless the current is known how can the future be projected. Therefore, before embarking on the manpower projections, it seems essential to make an appraisal of the current demand-supply situation. It is important to analyse carefully the reasons underlying the demand, employment practices, manpower shortages and surpluses and any other imbalances or special situations, so that the required adjustments for the future could be taken note of. The current demand may be influ-
enced by the nature and content of supply processes ("Supply Effect") and by employment practices which have been built up over a period of time ("Utilization Effect"). Sufficient allowance will need to be made on account of these factors in applying the current trend to any future situation.

It is also important to know what is happening in the labour market and how it is functioning? It is not usually recognised that the ways in which the labour market works in practice, may have an important effect on the extent to which problem of manpower surpluses or shortages are resolved. The understanding as to how labour market functions is crucial.

Labour market means the complex of economic and social factors involved in the process through which employers recruit workers and workers seek employment. It comprehends all the factors involving the demand and supply of labour, wage differentials, variations in nature of work, employers' hiring practices and the multitude of other working conditions, which shape employers-worker job relationship.

The labour market analysis brings into sharper focus and in more meaningful terms the current imbalances between demand and supply, both as they currently exist and in

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regard to changes which are expected to occur. The numerous manpower activities falling under the three vital areas of manpower field viz., development, utilization and distribution, interact in complex manner and may sometimes create manpower imbalances. A critical analysis of the labour market situation identifying the nature and type of imbalances and the reasons thereof is essential to determine whether problem is of mal-distribution, inadequate supply, insufficient and ineffective utilization of manpower, lack of motivation or incentives, inadequate logistic support, low productivity, lack of co-ordination or of organization and management. The overall purpose of studying the functioning of labour market is to build up deeper knowledge and understanding about the cause and effect relationship of the various factors operating in the labour market so that the disease could be diagnosed correctly and an appropriate prescription is prescribed.

In assessing the current situation, it is important to know whether the employers are getting the persons according to their requirements. An analysis needs to be made by obtaining information from employers through sample surveys, regarding the nature and type of persons they require; the difficulties they are experiencing in getting suitable persons; their specification in respect of skill, wages etc., the types of persons available in the labour market and the deficiencies in them, nature of shortages they are experiencing and how they are managing in the absence of
suitable persons and their suggestions for developing manpower. It is also important to know how the technical persons are deployed. Are they entering the labour market in the field of their specialized training? What is the demand for these personnel in the labour market? Does the supply match with the employer's demand? There should be a proper coordination between educational/training and employment. For linking training programmes with labour market conditions, information on current demand is absolutely necessary. An assessment of current demand both quantitatively and qualitatively is, therefore, a pre-requisite for manpower demand projections. A detailed analysis covering all aspects should systematically be made.

V. Concept of shortages and surpluses

The demand for and the supply of personnel are interrelated in a complex and changing pattern. Any change in supply inevitably effects the demand, which, in turn, influences the supply.

Supply influences demand in many ways. For example, when technical workers are in excess supply, firms sometimes hire them for sales or other work previously done by less trained workers. On the other hand, shortages force employers to organize their work so as to get along with fewer technical workers.

The imbalance between demand and supply results in shortages and surpluses. Manpower shortages are felt as
inadequacies in the supply of particular kinds of personnel to fill specific kinds of jobs. An assertion that a manpower shortage exists, rests upon the criteria employed to judge the intensity of demand and the characteristics of the available supply. Both economic and non-economic criteria may be used to define the shortages. Thus manpower shortages and surpluses are of different kinds. A brief note on the concept and definition of different kinds of shortages and surpluses is given in Annexure I.

"Unfilled vacancies" are generally taken as an indicator of shortages. Those unfilled vacancies relating to the jobs which the employing establishments wish to fill up at the prevailing wage rates, but for which they are unable to locate manpower in the categories required, can be taken as shortage occupation. This kind of shortages may be called 'visible manpower shortages'.

Where the employing establishments are unable to locate manpower with requisite skills at the prevailing wage rates, unfilled vacancies might not continue indefinitely. Jobs might be filled up by upgraded manpower without the required skill. The jobs are, in this case, inadequately filled in the sense that lack of skills restricts production. Though there are no unfilled vacancies, yet shortages exist in a

5. This note has been prepared on the basis of discussion contained in the study (Ph.D. Thesis of Mathur, P.N.) on 'Supply and Demand for critical human skills in India's developing economy: A Case study for doctor', Delhi School of Economics, University of Delhi, 1969.
sense. This kind of inadequately filled up jobs constitute 'hidden manpower shortages'.

On a similar analogy, if a person is unable to find a job at a prevailing wage rate for quite a long period, he will not continue to remain unemployed indefinitely but will ultimately be driven to accept an inferior job. The person in this case, is employed in less productive work than he is capable of, because he would, otherwise be unemployed. Though the person is employed, yet unemployment exist in a sense. This kind of low productive employment may be termed 'hidden' or 'disguised' unemployment. (The terms 'disguised unemployment' has been used by different authors. Mrs Robinson, Prof. Nurkse and others, to describe different situations).

In a recent study, the concept of disguised unemployment has been applied to doctors. The study has revealed that surpluses of doctors started emerging from the year 1970 and these would continue till 1991. Prior to 1970, the position was almost balanced preceded by a situation of shortages during the period 1956-66. The unemployment continued to rise till 1981 when the peak was reached and thereafter it started declining. It was estimated that the magnitude of unemployment in the year 1981 was of the order

of 40,000. The acuteness of the problem is hidden by the nature of medical practice where unemployment can be 'disguised' rather than 'open'.

Presently we are mainly concerned with the concept of 'Hidden Shortages' as applied to nurses. Nurses are mostly employed in hospitals. If the nurse-bed ratio is very poor - i.e. if there are fewer nurses than are needed for a desired (minimum) degree of proficiency defined in technical terms, these shortages exist in a sense, though there may not be unfilled vacancies.