CHAPTER - III

METHODOLOGY

As mentioned in the preceding chapter, the present research study aims at undertaking an exercise on assessment of current and prospective requirements and availability of nursing manpower in the national health service development. In this context, a wide range of information would be needed on various aspects of nursing manpower viz., current availability and its deployment pattern, past pattern of growth, and development plan of health services for the future.

In view of above data requirements, it is clear that the present exercise is much more than a mere statistical exercise on estimating requirement and supply of nursing manpower on the basis of certain stipulated norms. The assessment of current situation essentially requires a look into the past events, which have helped emergence of the present which, in turn, provides a base for building up future edifice.

I. PROBLEMS OF MANPOWER STUDY IN NURSING

There are two critical problems for developing a methodological approach to this study. First, as has been pointed out earlier, the health services have grown in an ad hoc manner, without having sound, scientific bases on which to develop ideas concerning nursing manpower requirements. Second, there are major difficulties in measuring even such
“neutral” manpower issues as current supply of nursing personnel, their distribution among different states and between rural and urban areas, their deployment pattern and the labour market conditions operating for their absorption. In this context there are various conceptual and methodological issues involved in obtaining a consistent figure of current supply for a particular year and their distribution by different characteristics. The data available from various sources are often inconsistent, and not comparable due to the difference in their coverage, concepts and classification adopted. To be brought into consistent frame, the varied data available from some of the sources have to be pooled together, after examining their limitations and accounting for the same.

An attempt has been made to make a distinction between various terms used in the context of supply like labour force stock, effective stock, potential stock and working stock etc. Estimation of availability by states and rural/urban areas had been a very complex exercise which required an estimation of the interstate migration rates for nurses overtime.

Similarly, with regard to estimation of demand projection, it is not possible to foresee the trends of health service development in the coming years, because of the reasons given above. In the absence of the structure and functioning of the HSS envisaged for future years, appropriate choice had been made from among the techniques usually
adopted for manpower projections keeping in view the specific character of the category in question, who are usually engaged in a service oriented sector. The demand for nursing manpower is worked out on the basis of different alternative methods but the focus is mainly on programmatic/component method based on the service target approach. Service target approach involves setting up of targets for specific health services and then conversion of those targets into manpower requirements by means of staffing and productivity standards.

In the context, the issue is of obtaining a rational basis for setting targets. For this, various standard norms/ratios are a prerequisite, which are derived on the basis of past trends. The importance of past trends in the projection exercise cannot be over-emphasized because the existing situation has its causative roots in the past actions, policies and programmes operating in pull and push directions. A review of what was actually accomplished during the past and what main departures from the past trends are called for with what implications need to be determined. It may be mentioned that a lot of changes may be desirable but these may not be feasible. Only gradual change is possible and that too with great efforts. The technique of extrapolation of the past trends with due allowance has been used for projecting future trends.

The real problem is of availability of adequate and a wide range of information needed to undertake detailed
exercise. In addition to various statistical information, it is essential to get a good deal of data of non-quantifiable nature about manpower trends, problems and their causes to better evaluate and interpret statistical information. The position concerning making forecasts for future requirements becomes more difficult because neither is there a clear perspective of health services development for the future to define the health manpower development needs, nor are the existing data adequate enough to provide a base for making forecasts. Based on the examination of the data on current situation with regard to the health/infrastructural facilities/health manpower as available from various government documents, specific assumptions are made to project the situation for future years as the basis of alternative methods keeping in view the present deficiencies in the health service system and the guidelines provided by the National Health Policy.

II. DATA REQUIREMENT

In the absence of solid framework with regard to the health service development, we have to confine our study only to:

(i) building up of a base year stock of nursing personnel;

(ii) Estimating time series stock of nursing personnel for the period 1951-2001;

(iii) State-wise availability of nurses/ANMS/LHVS by rural and urban areas for the years 1971, 1981 and 1991; and

The specific needs of data requirements have been spelt out in the context of the above four points. A broad listing of the items of information relevant to an exercise of the present nature is given below :-

(I) Current Supply : The number of nursing personnel by level of training who are currently working and are available for work at particular date.

(II) Inflow : How many of the various categories of nursing personnel add to the current supply annually.

(III) Outflow : How many for various reasons go out of the pool of current supply.

(IV) Deployment pattern : Distribution by location, sex, age group, employment pattern, sector of employment and distribution by functions etc.

(V) Inter-state mobility : States having in/out migration vis-a-vis, their capacity to absorb their respective outturns.

(VI) Pattern of growth of : Number of hospitals, beds, health & medical infrastructure-PHCs, CHCs and sub-centres, etc., at different points of time.

(VII) Information on the pattern of growth of expenditure
on health & medical care services: in terms of expenditure on health & medical services as proportion to the total government budgeted expenditure and total national income (GDP), per capita expenditure on health.

(VIII) Information on health perspective: Future plans in terms of targets for different health programme in operation; and action programme envisaged to accomplish them.

Expectedly, information on above mentioned items, in straightway usable form, is not available from any official source. Various problems were faced due to the nature/type of data available in fragmentary manner. Therefore, in respect of each case, suitable ways had to be evolved at each step to find solution for the specific problem analysing the indications from the meagre data available. Being an analytical work, the job had to be accomplished through intelligent and approximate guesses derived by an in-depth insight into the phenomenon/past pattern of development and keeping in view the envisaged future scenario. Facing this complex challenge has been one of the major elements of this research.
III. **PROCESS OF DATA COLLECTION**

The broad approach adopted herein therefore involved:-

(a) Study of all the relevant literature on the subject critically examining their methodology and findings;

(b) Collection and collation of all statistical/non-statistical data available from different sources so as to bring out consistent sets of figures on various parameters of nursing manpower; and

(c) discussion with officials in Government and non-Government organisations.

The above approach, therefore, involved basically location, compilation and examination of various information as available from different sources as to what these con-note, their relevance in the present context, their ready usability and, if not, what adjustments are required to make them usable and how the adjustments can be made, etc. It can be realised that this turned out to be a most pains taking process.

IV. **MODE OF DATA COLLECTION**

The entire data were collected through personal visits. But for location of the desired data, initially all the libraries concerned with the subject viz., Trained Nurses/ of India, RAK Nursing College and Indian Nursing Council, Indian Council for Medical Research, Voluntary Health Association of India, National Institute of Health & Family Welfare, were visited and discussions were held with the concerned
persons (secretary/principal/or others) in the institutions to find out if any study of a similar kind had been conducted anywhere. Whatever documents/pieces of information/articles etc., were available from these institutions were obtained. But the major data were obtained from INC and the library of Central Bureau of Health Intelligence, Ministry of Health & Family Welfare. This had to be done by sitting in the library, going through the old documents and getting them duplicated/photocopied wherever possible and if not, were copied by hand.

Before embarking on the discussion with regard to the actual methodology adopted in respect of each of the above four items of work, a description of the data sources and the characteristics of the data available from them is essential, as these are the only sources and the data in their existing form have to be used after many adjustments. The major sources of information, in order of importance, are as follows:

V. SOURCES OF DATA

(a) **Indian Nursing Council**

Indian Nursing Council (INC) is the apex body established in 1947 for administering and controlling all academic matters relating to nursing education at the national level. It collects large quantities/amounts of data from the state councils and the various training schools and colleges, concerning training for general nurses, midwives,
ANMs and multi-purpose workers, post-Certificate courses and at the degree level in specifically designed questionnaires for the purpose. The data collected from these training institutions pertained to items like general particulars of the institute, administrative details, entrance requirements, particulars about teaching staff, physical facilities, number of students enrolled, hostel facilities, field teaching, laboratory and clinical facilities and details regarding curriculum taught. From state councils, it obtains the information on total number of qualified general nurses entered on the state councils' registers as at the end of each year, number qualified during the reference academic year, and the number of institutions imparting training for these specific courses.

It was noted, through discussion, that data available from training institutions are hardly compiled because of its bulk/size of the format and limited staff available with the council. The only data which is generally readily available are the ones obtained from state councils usually with a time lag of two - three years in specified format.

The limitations of the data available from the INC are that they do not represent the live registration on a particular date, as in most state councils, the registration is once for ever except for the states of Karnataka, Maharashtra, and Gujarat. Secondly, it does not provide the information for the smaller states which do not have their own councils. Thirdly, there is no indication with regard to the
rural/urban distribution are available. Likewise, data on actual admissions and intake levels are not available after 1982 but for the year 1986 due to significant response lapse from the different institutions.

b) Registrar General of India

Registrar General of India (RGI) through decennial census counts provides data on occupational distribution of workers classified at three digit level of National Classification of Occupations (NCO) 1958 adopted in Census prior to 1971 and the NCO 1968 adopted in 1981 census. Information regarding nurses is provided in two broad occupation groups e.g. "Nurses" and "Midwives & Health Visitors" for rural/urban areas separately for each of the state and union territories of India.

The limitations of these data are that these are available once in ten years; generally published with a time lag of 4–5 years and do include a number of such persons who are in a particular occupation without being formally trained for the same i.e. "practicals" who have attained the particular skill while working on the job either as apprentice or from his/her family members. Also, as the information is obtained from individuals through one's own reporting, it is liable to suffer from the reporting error. Data on projected population at quinquennial intervals by sex, quinquennial age group and R/U areas are also available from the office of the RGI through its report of the Expert
Committee on Population Projections, occasional paper No.4/1988. It also provides information on various demographic indicators.

(c) Director General of Employment & Training (DGE&T)

The DGE&T under Ministry of Labour brings out a publication entitled 'Occupational Pattern in Public Sector' and 'Occupational Pattern in Private Sector' on alternate basis thus biennially. In this publication the data with respect to those working in the sector are provided at five digit level of National Classification of Occupation (1968). The data for the purpose are collected through Employment Market Information (EMI) returns furnished by all establishments in public sector and the establishments employing 20+ workers without use of power and 10+ workers with use of power in private sector. The submission of the return is not a statutory obligation. That is why, there are serious lapses in the coverage due to non-response of organisations, which varies from year to year. It is even more serious in respect of private sector establishments. However, these do provide indications with regard to the employment of nurses in these sectors.

Besides, the bulletin on "Job Opportunities in India", the quarterly issues and the annual issue provide important information with regard to the number of vacancies notified to employment exchanges, vacancies advertised by UPSC, State Public Service Commissions and the Railway Board etc., and
the number of vacancies which could not be filled due to non-availability of suitable candidates with further details like the name of the post, pay scale and the requisite qualification etc. The publication does not provide the state-wise data. The number of persons registered with employment exchanges are also available. The data are thus valuable with regard to the analysis of the labour market situation in a limited sense.

(d) Ministry of Health & Family Welfare

Ministry of Health & Family Welfare, through its two valuable publications "Health Information of India" (erstwhile Health Statistics of India) and "Bulletin on Rural Health Statistics" (quarterly and the annual issues), apart from various others, provide useful data required for an exercise of this kind. The specific items of information on which the data are available from these publications are pattern of investment and expenditure on health, health manpower statistics, medical care services and community health services. The data on health manpower statistics are however, quite deficient. The number of registered personnel available with professional council (INC) are reproduced to show the total availability. In respect of nurses in rural areas, the columns are mostly filled with 'INR' i.e. information not received or the same figure is repeated for years together. The data on infrastructure available under health services, are fairly reliable but do not show person-
nel employed therein so as to be useful for better insights into the deployment pattern of the personnel available.

In addition to the above sources, the reports of the various committees, working groups, the National Health Policy and the Five Year Plan documents, brought out by the Government of India/Planning Commission, IAHM, ICMR, ICSSR etc., formed important sources of information regarding the development strategy of health services over the past four decades.

VI. REVIEW OF LITERATURE

As mentioned earlier, very little health system research has been done on the health service development in India. Similarly a few studies have been undertaken even in the health manpower field and particularly with respect to nursing manpower. In a DGHS publication entitled "Health Services Research in India: An Inventory" (April 1983), it was brought out that no research project in the field of manpower - training and development, including projections of manpower requirements - either have been completed or is in progress. This piece of information, though may be valid for the purpose of preparing an inventory yet it does not provide complete information. In fact manpower considerations have all along been explicit in the reports of the various committees set up by the Government of India at different points of time to study health service development or a specific aspect of the same. But due to lack of a
scientific approach to the health service development, the manpower consideration came up in a disintegrated manner.

Besides, a number of exercises have been undertaken on estimation of supply and requirement of the various categories of health and medical personnel by different organisations, viz., Planning Commission, Directorate of Manpower, and IAMR etc. However, in the beginning, most of the studies were confined to the category of doctors. In early 1950s, the Perspective Planning Division (PPD), Planning Commission had conducted a study entitled 'Doctors in India, 1956' and in the study it developed a technique for stock estimation. After allowing for emigration due to partition in proportion to the outturns of the respective medical colleges located in the cities of the two countries, an attrition rate of 2.5 percent per annum was applied to account for emigration and mortality. Afterwards, in 1964, the Institute of Applied Manpower Research initiated a series of studies of on health and medical personnel. As part of the same, the stock estimate were built up for doctors, nurses, dentists and pharmacists.

On the aspect of requirements, a pioneering work on "doctors" was done by P.N. Mathur in 1968 as part of his doctoral work in the University of Delhi under the supervision of Prof. Amartya K. Sen. This is a most scientific and comprehensive study on the subject. The study had worked out the state-wise stock of doctors for the period 1966-1986 duly allowing for inter-state mobility. The inter-state
mobility aspect had been studied by analysing the effect of various factors viz., place of residence, place of passing, place of registration and national income of the state on the movement of doctors from one state to another by calculating multiple and partial co-relation coefficient to measure the degree of association. It indicated that doctors were quite mobile and their movement from area to area was largely due to the regional income differentials. The estimate of requirements upto 1986 were worked out by four alternative methods viz. (1) specific doctor : population norms developed on the basis of economic data of different countries whose stage of development being that envisaged for India in 1986 (2) establishing relationship between growth for national income and stock of doctors (3) fitting appropriate regression curve (of stock of doctors on national income) to the data of 67 countries and deriving demand for doctors in India from income forecasts and (4) Programmatic/component approach. At that time, the study concluded that significant surpluses of doctors would emerge during 1971-1986 while the official pronouncements decried the shortages of doctors. The study also estimated the magnitude of "brain drain" by analysing the fragmented data on inflow and outflow of doctors available from the Ministry of External Affairs. The study had been first of its own kind that attempts to provide insights in to the application of the various forecasting techniques to the health manpower analysis under the conditions of various
constraints and limited data availability.

During all this period little attention was paid to the category of "nurses", as the concern of the planners was on high level manpower categories whose shortage according to them could create bottlenecks to growth. A brief review of a few isolated studies conducted in the context of nursing manpower is given in the following paragraphs.

Inadequate availability of trained manpower has been treated as one of the causes of low status of health, at the very beginning of the planning era. In the First Five Year Plan document, it was urged that maternal and child health be a part of the general health services and one centre should serve a population of 10,000 with a minimum staff of one health visitor and two midwives as against the then availability of one nurse per 43,000 population, one health visitor for 4 lakh population and a midwife for 60,000 persons. The document further stated that 3000 nurses and 1932 midwives should be trained annually. The Second plan document also did complain about shortages of personnel and has mentioned about the availability of nursing personnel on the basis of registration figures of INC. It had worked out the requirements for nurses/midwives and health visitors on the basis of the targetted ratio of one nurse: 5000 persons, one midwife for 5000 persons and one health visitor for 20,000 persons. Similarly the Third Plan document has also referred to the persisting shortages of nursing personnel and emphasised the need for increasing their training
facilities. The basis of these statements had seemingly been the shortfall in the achievement of a targeted nurses/population ratio. At no stage, till then an attempt was made to relate the availability of such personnel to a particular level of services expected to be available to the population.

A systematic effort to estimate the supply of nursing personnel was made in 1964 by IAMR, which attempted the estimation of supply of nurses, midwives, ANMs and health visitors in the year 1965. The study had examined each source of data i.e. Census, DGE&T and INC independently and has reproduced the various data as available from them without making any attempt to adjust them for their limitations. In the context, finally, the study has estimated the stock on the basis of accumulation of outturns. The exercise took the registration figures of 1949 available with INC as base, added the outturn figures of respective courses during the period 1950-1964, and allowed for attrition on account of mortality by applying the age specific mortality rates as obtained from Life Insurance Corporation. The exercise, however, does not make the basis of their calculation clear at any stage. Another attempt on the aspect of supply was made by IAMR in 1985, in which it considered the categories

of Nurses, ANMs, Health Visitors and diploma holders in Pharmacy. The time horizon for this study was 1991. Maintaining the continuity of the effort, the study has rightly started with 1965 base of its previous attempt allowed for attrition of 1.5% per annum for nurses and of 0.6% p.a. for auxiliary-nurse-midwife and health visitors. But the study failed to examine the impact of the recommendations of Kartar Singh Committee on the structure of the availability of these personnel. This study has not attempted any state-wise availability.

The Coordinating Agency for Health Planning (CAHP) had also attempted to work out the requirements and availability of nursing personnel in 1973. For the purpose, the CAHP had mailed questionnaires to 1709 general nurses (1520 females and 189 males), 161 LHV's and 601 ANMs, these together constituted 2% of the total registered nursing personnel. Of these, responses were received from nearly 25% - 448 general nurses, 200 ANMs and 65 LHV's. The time horizon for this exercise too was 1990. The distinct features of this exercise was that (i) it is based on a very small and undefined sample, even that with only 25 per cent response. (ii) it did not scientifically examine the previous exercises. (iii) the attrition rates assumed were very high based on the responses to their mailed enquiry; (iv) the regional disparities were studied on the basis of membership of TNAI.

in 1971 and (v) the requirements were worked out on the basis of quite unrealistic nurse: population ratio and nurse:doctor ratio (suggested by Bhore Committee) without analysing the existing situation regarding the availability of such personnel.

On the aspect of estimation of requirements too, IAMR had attempted the demand for nursing personnel for Fourth and Fifth Plan periods. It had worked out the requirements of general nurses and ANMs by using component/pragmatic approach. The estimates worked out by this approach were also compared with estimates based on the global ratios in respect of nurses:population ratio; nurse:doctor ratio and the nurse: health expenditure ratios. The components considered were (i) beds in hospitals and dispensaries (ii) family planning (iii) administration and (iv) teaching. The attempt, though quite scientific for the period, lacked the initiative in fixing somewhat pragmatic ratios at the envisaged future date; it also did not visualise that all teaching posts are not held by general nurses and also did not make any analysis of regional variations.

Another worth mentioning exercise on the aspect of estimation of requirements is the elaborate exercise undertaken by the Expert Committee on "Manpower Planning, Production and Management" (1987) and the figures were later

reproduced by the High Power Committee on Nursing & Nursing Profession 1989. The time horizon for this exercise is the year 2000 AD. The main fallacy of this exercise is the total lack of insights into the development of health services over time and again coming out with huge requirements based on quite unrealistic ratios fixed to be achieved by the year 2001. It appears that the exercise was not attempted with a view to providing practical policy making guidelines. In this exercise too, no attempt has been made to estimate the requirements by States.

These are some of the studies which have been later referred to in the relevant context. The present exercise, therefore, has its claim of being more pragmatic based on a thorough analysis of the existing situation and also presents state-wise estimates of availability and requirements for rural and urban areas separately.

Now we proceed on to discuss the methodology adopted in respect of each of the major items of work specified earlier detailing briefly the problems/issues confronted and the way these were resolved:

VII. DETAILS OF METHODOLOGY ADOPTED:

(a) Building up Base Year Stock

From a manpower angles, the current pool of qualified nurses in terms of labour force concept is the starting point for any exercise on estimates of demand and supply. But none of the data sources mentioned above provides a
complete picture of the total availability of the qualified nurses at a point of time. Census figures cover only workers including practicals, INC provides registration including many such nurses who have died or emigrated and the DGE&T coverage is far from satisfactory.

Hence in the present exercise, we have worked out the stock estimates for the base year (1981) by accumulating the outturn figures for the past years, which implied either since the inception of the course or the earliest year for which the data could be obtained from the INC. The accumulation was done on annual basis and the outturn of each year were discounted for attrition. This process automatically depleted practicals, took note of mortality and emigration. The stock so built was compared with Census and INC figures to assess the quantum of discrepancy in the coverage of their data and the nature of discrepancy. Based on the comparison, the relative figures of practicals and number of nurses in rural/urban areas have been worked out. Again, this stock after the application of appropriate labour force participation rates, provided the figure of labour force stock of qualified nurses.

The estimated stock of qualified personnel was further distributed by various characteristics like by level of training, by rural/urban distribution, by major function, by age group and by activity status etc., in order to get insights into their deployment, utilization and distribution pattern. This has been done only in respect of three basic
categories i.e. general nurses, ANMs and B.Sc.(N) by those characteristics for which some indications could be obtained from the meagre data available from any field survey, regular source or research studies undertaken at any point of time.

b) **Time Series Estimates of Supply of Nursing Manpower 1951-2001 : Reconciliation & Cross-checking**

The specific feature of this exercise was to provide the series of estimates for all categories of nursing personnel over time which were consistent with the estimates of earlier exercises, if any, undertaken at any point of time. The estimates, therefore, derived in the present exercise based on accumulation of educational output were checked for the backward consistency with previous attempts and attempt was made not to discard the previous estimates as far as possible until and unless found totally inconsistent. This was done to preserve the continuity of effort made in this direction.

It is for this reason that the base year stock developed in this exercise for GNs, ANMs and LHVs had not been used as the starting point for working out the time-series exercise up to 2001. Instead, the stock for any intermittent year prior to the base year available from any other source has been used as the starting point ensuring that the series proves consistent with base year stock in 1981 as the base year stock remains as a cross check and control figure for the entire exercise.
There had been problems associated with measurement of outflows i.e. mortality and emigration. These have been determined by analysing the findings of the previous studies and the fragmentary data available from Registrar General of India and Life Insurance Corporation.

(c) State-wise Estimates of Supply of Nursing Personnel during 1971; 1981 and 1991 by Location

Here again, by adopting the stock estimates worked out on the basis of accumulative educational outputs for the 1971, 1981 and 1991 as the control figures at the national level, their availability by states and also by rural/urban areas have been worked out. To some extent, the basis for this exercise on distribution over states was obtained from the Census data after due adjustments for 'practicals' and undercount on account of ANMs/LHVs.

The exercise on state-wise estimation, however, had been a complex exercise as it needed the trends on inter-state-migration rates. All those who pass out from a particular state are neither essentially the residents of that state nor do they settle down in the same state, depending upon the availability of employment opportunities therein. For the purpose, an appropriate technique has been developed to estimate the inter-state migration rates, using census data vis-a-vis the individual state's capacity to absorb its output and the number graduating during the corresponding period. As the data on nurses by states are
not yet published by Census for the year 1991, the likely inter-state migration rates for the period 1991 - 2000 could not be attempted.

Similarly, the estimates of nurses by location i.e. rural/urban areas too had been a critical exercise. These have been worked out by developing appropriate method separately for general nurses, ANMs and LHVs/PHN/HA(F) keeping in view the data available. Nevertheless, broadly the infrastructure available in rural areas have been used as basis to work out the availability of these personnel there.

(d) Estimates of Requirements of General Nurses & ANMs/LHVs in 2001

The estimates of requirements for general nurses have been worked out by using four alternative methods viz., nurse : population ratio norm; nurse : doctor ratio norm; nurse : expenditure relationship and the component approach and the requirements for ANMs/LHVs through programmatic approach but by combining it with population ratio and the staffing pattern norms - the two indicators provided by the Government of India to provide rural health services.

The estimates of requirements are also worked out for states for these two categories but in case of nurse under only two alternatives - the nurse : population ratio norm and the component approach.

The specific feature of this exercise had been that
most pragmatic targets of the envisaged norm have been determined for the year 2001, duly considering the various constraints reflected by the trends of past performance.

The nurse: population ratio for the year 2001 has been fixed at '3638' on the basis of the linear relationship observed during 1981-1991, on annual basis, between time and the ratio. This ratio, so fixed is still much higher than the one recommended by Mudaliar Committee being one nurse for 2000 persons to be achieved by 1981. And for each state, the targets for nurse population ratio have been determined independently taking the past performance as the basis for future achievement.

For working out the requirements of nurses on the basis of nurse: doctor ratio, first the estimates of "employee" doctors are worked out for the years 1981 to 1991 and for the year 2001 as the proportion of doctors working as self-employed is quite high and these self-employed doctors usually work as private practitioner do not engage the services of nurses. A significant positive co-relation was observed between the number of employee doctors and the growth in number of nurses. It was, therefore, logical to assume that the growth in number of employee doctors would call for increase in number of nurses too. However, the requirements of nurses were worked out under four different alternative assumptions regarding nurse: doctor ratio being respectively 1.1 (based on past trends); 1.5 - low, 2.0 - medium and 3.0 high assumption, to provide the range of
requirements on a scale. It may be emphasised again that in the absence of even a broad perspective of HSD, recourse had to be taken to make projections on the basis of the ratios.

Noticing a significant positive co-relation between the number of nurses and the actual expenditure on health & family welfare during 1981-88 at constant 1980-81 price level, the "expenditure" was considered as a logical indicator for working out the requirement of nurses at a future date. The expenditure on health & family welfare is not an independent variable. It emanates from the gross domestic product of the country and the relative priority accorded to this sector vis-a-vis other claims. Therefore, in the present exercise, first the level of GDP has been estimated for 2001 by applying the envisaged growth rates during VIII and IX Five Year Plan periods as obtained from the Document on 'Eight Five Year Plan 1993-97 brought out by Planning Commission. Then the level of expenditure on health and family welfare sector during future years, has been worked out on the basis of the observed past relationship between the GDP and the expenditure on health & family welfare during 1981-88. The expenditure so estimated is then used to derive the requirements of nurses based thereupon for the year 2001.

The estimation of requirements for nurses under component approach implied the estimation of requirements for four components e.g. bed : patient care in hospitals; for administration, for teaching and for community services.
The requirements for bed: patient care were worked out by first determining the number of beds in each state in the year 2001 and thereafter the requirements of nurses were derived by using appropriate nurse: bed ratio norm in the years 2001 which was determined separately in respect of each state by considering the various related factors. The demand for nurses in "administration" has been worked out by converting the estimated number of beds in 2001 in each state among number of hospitals of different sizes and thereafter the number of nurses required for this segment was derived by applying the staff norms available for hospitals of different sizes in respect of the personnel like superintendent, deputy superintendent, assistant superintendent, matron and assistant matron etc., who usually perform various administrative functions and do not engage directly in the function relating to bed: patient care in a hospital setting. The demand for nurses as teachers is derived by apportioning the total requirement of teachers which was estimated by applying standard teacher-pupil ratio provided by the INC to the estimated admissions in the year 2001. For getting a basis for apportioning the teaching posts among general nurses and others, the data from the institution-wise formats available with INC for the latest year (1989 at that time) was compiled and a distribution of teachers in 92 institutions (which have furnished complete information in the formats) by post, qualification and the institution by management was worked
out. This revealed that a significant (68.4%) proportion of the teaching posts were held by graduates in nursing and others, and the rest were held by general nurses. For working out the requirements of general nurses in community health services, first the number of CHCs, PHCs and sub-centres were estimated in the year 2001, on the basis of the institution: population norm provided by the Government of India. The norms provided by the Government of India are different for “plain” areas and those for “hilly” and “tribal” areas. It, therefore, needed population disaggregation by these criteria for the year 2001. On the basis of the findings of certain field studies, it was noted that difficulties in the outreach of facilities does not essentially link up with criteria of being hilly, desert or tribal, but it is essentially linked with the toughness expressed in term of “remoteness” of the area. In the context of the exercise, we have, therefore, first estimated the population residing in difficult areas by super-imposing the percentage of tribal population to rural population and the dispersion of population measured in terms of the density of a given state as percentage to the all-India density. And then envisaged number of CHCs, PHCs and sub-centres have been worked separately for plain and difficult areas and based on the the number of nurses required are derived by using the recommended staffing pattern norms.

It may be mentioned that same set of infrastructure has been used for estimating the requirements for ANMs/LHVs.
This discussion in the foregoing paragraphs shows the complexity of the exercise undertaken in the present study while estimating the current and prospective demand and supply of nursing personnel. The practical implications of the methodology spelt above in respect of each of the item of work with appropriate figurative evidences are, however, discussed in the related chapter and at appropriate juncture.

VIII. Time Frame

The work on location of relevant literature and data was started in the year Jan 1990; and the major part of this work was completed by the Jan 1991. However, additional data as and when available from any source was collected till the beginning of 1992.

IX. Presentation of the data

After the introductory discussion of the problem and HSMD (Health Service & Manpower Development), respectively in Chapters I and II, the study presents the details and the results of the exercise in Chapter IV onwards. It needs specific mention that because of the special nature of the issues involved in each process of estimating supply and demand, the methodological issues that are specific to this are discussed just before the actual exercise in separate chapters. As such, a discussion on the various methodological and conceptual issues involved in estimating
the supply is made in chapter IV. Chapter V briefly discusses the history of development of the different programmes of nursing education imparting training at various levels e.g. degree, diploma and certificate and also provides relevant data on growth of training facilities for them. Chapters VI, VII and VIII respectively provide the results of the exercise on supply estimation as three separate sections being (i) Current Availability of Nursing Manpower (ii) Nursing Manpower Supply during 1951 - 2000 and (iii) States-wise estimates of supply of Nursing Personnel, 1971, 1981, and 1991. The Chapter IX & X are respectively on the Nursing Manpower requirements. Chapter IX discusses the various conceptual and methodological issues involved in the process of demand projection and chapter X presents the various sets of estimates of requirements using alternative methods. A comparison of the estimated demand projections with probable supply at the national level and for different states in the year 2001 is attempted in Chapter XI.

Chapter XII briefly discusses the perspective of nursing profession and the salient findings of the entire exercise are summarisingly presented in Chapter XIII along with the concluding observations on the exercise.