CHAPTER III

DATA AND METHODOLOGY

"The competent physician must constantly be abreast to latest discoveries in the field of medicine. The successful lawyer must be able to locate the information pertinent to the case in hand obviously. The careful student and investigator should become familiar with the location and use of sources of educational information".

- C. V. Good, A. S. Barr and D. E. Scotes
CHAPTER III

DATA AND METHODOLOGY

An educational and scientific problem can be resolved only on the basis of data. A major responsibility of the researcher is to devise research design capable of providing the information necessary for the solution of the problem. Therefore, after specifying the problem, listing the objectives and providing review of relevant literature in the preceding chapters, the present chapter deals with the plan and procedure adopted in the present study. The same is attempted below in the following sequence:

1. The Method
2. The Sample
3. Tools Used
4. Administration of tools
5. Sources of the data
6. Collection of the data
7. Procedure of the data analysis
8. Unit cost of nursing training
9. Procedure for calculating the rate of return

3.1 THE METHOD

Keeping in view the nature of the present study, survey method was considered to be the most appropriate. Survey studies are conducted to collect data of existing phenomenon with a view to investigate current conditions and practices. Survey is
oriented towards the determination of the status of a given phenomenon rather than the isolation of causative factors. It deals not merely with collection of the data, their analysis, interpretation and report on the status of existing institutions, groups or areas in order to guide practices in immediate future, but it also determines the adequacy of the status by comparing them with the established standards or norms for understanding and finding the solution of significant educational problems.

3.2 THE SAMPLE

In any survey of research, covering the entire population is practically an impossible task. What is feasible and generally practiced is to study a sample representative of the population. A sample is, thus, a subset of the population under study. The aim in sampling is to choose a subset in a way that it will be adequate in size and representative of the population as a whole.

The present study is being carried out to find the economic rates of return from investment in nursing training of the women in Haryana. Therefore, all the women's Nursing Training Colleges of Haryana State constituted the population of the present study. For drawing the sample of the present study, eight districts were selected by employing simple random sampling technique (by lottery method). The districts thus selected were Ambala, Karnal, Gurgaon, Mahendargarh, Rohtak, Bhiwani, Hisar and Sirsa.
After having selected the districts, eight women nursing colleges of these districts were included in the sample and an effort was made to contact all the ex-trainees from 1981-82 to 1992-93 session of these institutions (of all the nursing courses available) and 1000 ex-trainees of these colleges finally constituted the sample of the present study subject to their availability on addresses given in office records of their respective nursing colleges. The list of the nursing colleges of the eight districts selected and the composition of the sample of ex-trainees is given in the tables below:

**TABLE 3.1**

**DISTRICT WISE BREAK UP OF THE NURSING TRAINING COLLEGES INCLUDED IN THE SAMPLE**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>District</th>
<th>Number of Nursing Colleges located in the district</th>
<th>Number of Nursing Colleges selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ambala</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Karnal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Gurgaon</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Mahendargarh</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Rohtak</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Bhiwani</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Hisar</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Sirsa</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>Eight</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>
### TABLE 3.2
NURSING TRAINING COLLEGES / COLLEGES SELECTED FOR STUDY

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name of the College</th>
<th>District</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General Hospital, Ambala</td>
<td>Ambala</td>
</tr>
<tr>
<td>2.</td>
<td>General Hospital, Karnal</td>
<td>Karnal</td>
</tr>
<tr>
<td>3.</td>
<td>General Hospital, Gurgaon</td>
<td>Gurgaon</td>
</tr>
<tr>
<td>4.</td>
<td>General Hospital, Narnaul</td>
<td>Mahendargarh</td>
</tr>
<tr>
<td>5.</td>
<td>General Hospital, Rohtak</td>
<td>Rohtak</td>
</tr>
<tr>
<td>6.</td>
<td>General Hospital, Bhiwani</td>
<td>Bhiwani</td>
</tr>
<tr>
<td>7.</td>
<td>General Hospital, Hisar</td>
<td>Hisar</td>
</tr>
<tr>
<td>8.</td>
<td>General Hospital, Sirsa</td>
<td>Sirsa</td>
</tr>
</tbody>
</table>

### TABLE 3.3
COURSE WISE COMPOSITION OF THE SAMPLE OF EX-TRAINEES

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name of the course</th>
<th>No. of Ex-Trainees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General Nursing and Midwifery (GNM)</td>
<td>699</td>
</tr>
<tr>
<td>2.</td>
<td>Auxilliary Nurse and Midwife (ANM)</td>
<td>090</td>
</tr>
<tr>
<td>3.</td>
<td>Multi Purpose Worker (M.P.W.)</td>
<td>211</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1000</td>
</tr>
</tbody>
</table>
Apart from 1000 ex-trainees (respondents), the study also included all the heads of these institutions/colleges and two teachers from each nursing college. Moreover, 100 dropouts of the eight nursing colleges belonging to all the three courses were also contacted in order to find out the opportunity cost of nursing colleges in Haryana.

3.3 TOOLS USED

The selection of tools for a particular study depends upon various considerations, viz. objectives of the study, amount of time at the disposal of the researcher, availability of suitable tests, personal competence of researcher to administer, score, interpret the results and so on. Taking these factors into consideration, the following tools were constructed and used in this study.

Schedule I : Schedule for the Institutional Heads

This schedule was constructed by the researcher in order to collect information regarding the objectives of nursing training, quantitative and qualitative analysis of the working of the colleges, fixed and variable costs, financial pattern, physical and infrastructural facilities. This schedule contains 56 items. The schedule is given in Appendix I.
Schedule II: Schedule for the Staff Members

This schedule was constructed to obtain information about the working of the colleges by teaching members of the staff. This schedule contains 25 items. This schedule is given in Appendix II.

Schedule III: Schedule for Ex-Trainees

This schedule was used to collect information regarding the socio economic characteristics and present economic status (earnings of the ex-trainees of the nursing colleges). The schedule contains 25 items pertaining to the objectives of the present study. The schedule is given in Appendix III.

Information Blank

All information blank was used to collect the information about the income and the expenditure on nursing training in the colleges.

These schedules included different number of items and most of the items were divided into several sub items. Most of the items were very specific and required yes/no type of response from the respondents. Some items were descriptive and the respondents were instructed to write a few words of their own in brief.

In order to construct the schedules, the researcher conducted a pilot study on the Nursing College in Ambala. On the basis of the observations, interviews with the head, teachers and ex-
trainees of this college and by studying the printed materials related to the concerned field, the schedules were prepared. But their content validity was checked through judgments of experts including experienced teachers of economics/statistics.

3.4 SOURCES OF DATA

For the present study, both primary and secondary sources of data have been used. The primary data under the heading of earnings and socio economic characteristics, employment opportunities were collected from a sample of 1000 ex-trainees of the nursing colleges who took training before July 1993. The primary data concerning the opportunity cost were collected from 100 dropouts of these colleges who were once registered in the nursing colleges but could not complete the training. Data regarding infrastructural facilities of the colleges were collected from the heads and the teachers of the respective colleges.

The secondary sources of data used in this study include annual budget estimates, audit reports, follow up registers and attendance registers of the nursing colleges. Apart from these, other published and unpublished documents of the colleges pertaining to the period of study were also consulted.

Administration of Tools

The researcher visited all the nursing colleges included in the sample for the collection of data. The researcher first discussed in detail about the need, importance and significance
of the present study with the heads and the teachers of the colleges. After seeking prior permission of the heads of the nursing colleges, the schedules were administered.

For the purpose of collecting information, the schedules were given to the heads of the nursing colleges and the teachers of the nursing colleges selected for the study by the researcher and the required information was obtained from them.

For the purpose of collecting information from the ex-trainees of these colleges, the necessary steps were taken into consideration. The researcher first collected their names and addresses from the previous attendance registers of the nursing colleges with the co-operation of the clerical staff of the respective colleges. Thereafter interviews were conducted with the help of the schedules for collecting the necessary information.

**Collection of Data**

Both primary and secondary data were collected. All the nursing colleges of the different districts of Haryana were personally visited by the researcher. The information regarding the objectives, physical and infrastructural facilities, staffing pattern, financial pattern, fixed and variable costs was collected with the help of the 'Schedule for the head of the Institution' for that particular nursing college. The data regarding the efficiency and productivity of the nursing college, socio economic characteristics, type and duration of the training, type of employment and waiting
period for employment etc. was collected from the 1000 ex-trainees of different training with the help of the 'Schedule for ex-trainees of the institution'.

In order to check the authenticity of the information provided by the heads of nursing colleges, the data from 16 teachers was also collected (two teachers from each institution) with the help of the 'Schedule for the staff members'.

In order to collect information about opportunity cost, the data was collected from dropouts who were once registered/admitted in these colleges but dropped out before completing the course due to some reasons.

Secondary data was collected from Annual Budget estimates. Annual expenditure reports from 1991-92 to 1993-94 of the nursing colleges, attendance and follow up registers, records of employment exchanges regarding the employment of nursing trained persons and other published and unpublished documents concerning the research work.

3.5 PROCEDURE OF DATA ANALYSIS

In the present study, the following statistical techniques were used for the analysis and interpretation of the data regarding finances (income and expenditure).

**Unit Cost of Nursing Training**

Costs of education have no meaning if they do not refer to a unit. Ideally, educational unit can be defined as the ability
acquired by the educated to participate in the development of the economy and the civilisation. Ability as such can not be measured in any meaningful way. Hence, in practice, the 'unit' in the unit cost of education refers to the number of pupils enrolled or on rolls. Sometimes, it is also agreed that the number of pupils actually attending the colleges should be taken as the units and not the total number of students enrolled. The great divergence between the enrolment and the attendance particularly in nursing colleges tends to support this argument.

In the present study, unit cost means cost per trainee. The calculation of unit cost per trainee in the present study is important in two ways. Firstly, it helps in knowing per trainee cost of nursing training and secondly, it is used to calculate the rate of return on investment in nursing training. The study of unit cost for this purpose is limited to the direct and indirect cost of training and is a point estimate pertaining to the year 1993-94.

**Direct Cost**

In the present study, 'Direct Cost' implies the costs which were spent by the individual or by the government to produce a nursing trained individual. For the calculations of unit cost, only direct public cost was taken into consideration because direct private cost was almost nil as no fee was charged for the training but only Rs. 85/- per year were charged for annual funds. Raw material was being provided free of cost to the individuals by the
institution and 33.3 percent of the trainees were getting stipend per month. So the effect of private cost on total cost was almost negligible and therefore it was not included in the total direct cost.

**Indirect Cost**

The indirect (opportunity) cost or income foregone consists of the income that a student would have earned, had she gone in for employment at that time instead of pursuing education. The method of calculating this cost is a controversial issue. The earning potential of persons with different educational attainments being different, this cost varies at different levels of education. In the present study, indirect cost has been taken as the earnings foregone while receiving nursing training during the working age period taken to begin at the age of 15 years or after matriculation. For the computation of indirect cost, 100 dropouts (women) were chosen who were admitted at a given time in nursing colleges but due to some reason they had to drop out. The earnings of these women were taken for the calculation of opportunity cost.

**Imputed Rental Value**

The process of producing trained women required not only teaching and non teaching staff, but also building, furniture and equipment. Therefore, the estimates of cost of nursing training also required inclusion of this component as well. Ideally, such estimates, should be based on architectural plan as followed by different training colleges and the cost of new construction. In the
present study, for calculating per unit rental value (in percent), approximate total present value of building and equipment was taken and this was divided by the number of students and multiplied by 10 percent rate of interest. The formula for calculating rental value is as follows:

\[
\text{Per Unit Rental Value} = \frac{\text{Present value of building and equipment}}{\text{Enrolment}} \times 10 \times 100
\]

In this manner, for calculating unit cost, both direct and indirect cost of training plus unit rental value form the basis and the formula for computation of unit cost is as follows:

\[
\text{Unit Cost} = \frac{\text{Total cost of training}}{\text{Number of trainees}}
\]

Symbolically,

\[
U_c = \frac{T_c}{N}
\]

Where \(U_c\) = Unit Cost

\(T_c = C = \text{Total Cost}\)

\(N = \text{Number of students enrolled}\)

In order to study the effect of the age of the institution (A), enrolment (N), average pay of the teacher (T/n) and ratio of non teaching cost to total cost (C-T) on the unit cost (Uc), regression analysis has been used.

The unit cost of nursing training \(U_c\) (the dependent variable) was regressed with the four explanatory variables by the following multiple regression equation:

\[
U_c = b_0 + b_1(A) + b_2(N) + b_3(T/n) + b_4 \left(\frac{C-T}{C}\right) - (3.1) \text{ of section 3.5}
\]
3.6 FINANCIAL PATTERN OF THE NURSING TRAINING - INCOME AND EXPENDITURE

For financial pattern of the nursing training, the following procedure has been used:

1. The surplus and deficit finance was calculated by subtracting the expenditure from the income.

2. To analyse the pattern and direction of expenditure on nursing training, the magnitude and trend of expenses were obtained by:

   a) Calculating Index

   b) Calculating percentage figure

   For the calculation of 'Index', the year 1991-92 was taken as the base year, and the amount of expenditure on each item was taken as 100 in that year. The index for the 1993-94 was calculated as follows:

   \[ \text{Index} = \frac{\text{Amount of Expenditure on each item in the current year}}{\text{Amount of Expenditure on that item in the base year}} \times 100 \]

   Percentage figures of expenditure were calculated as:

   \[ \text{Percentage} = \frac{\text{Each item of expenditure for a year}}{\text{Total expenditure of that year}} \times 100 \]

Procedure for Calculating Rate of Return

Expenditure on nursing training can be considered as an investment because we expect some yield from it in the future. An amount which is not returnable cannot be called investment. It will simply be an expenditure. The phrase "Education is an
Investment" is not a metaphor. Therefore, it ought to be possible to calculate rates of return on transforming the present earning into the future earning via educational investment.

The calculation of rates of return of education is similar to the calculation of marginal efficiency of capital based on the calculation of compound rates of interest. It involves nothing more than the laws of Arithmetic. For example, X amount invested today will yield X + Y amount at some time in future due to the productivity of investment. Therefore, reversing the process, to relate this future income to its present value, one must discount the future stream to the present time when investment is taking place.

3.7 ESTIMATION PROCEDURE

There exist mainly three methods for estimating rates of return to investment in education. Their particular utilisation depends upon the availability of data and degree of accuracy. But in the present study, elaborate method has been used for calculating rates of return on investment in nursing training of women.

Elaborate Method

According to this method there are two basic ingredients for rates of return calculation, that is, age earning profiles and unit cost of training. Rate of return was calculated in the following three steps.
Step 1

For the computation of the rate of return to investment in nursing training of women, calculation was done of the cost (direct and indirect) and benefits during the life time of a trainee who received nursing training. In the present study, the foregone (opportunity) earnings, which the trainee was already in position to earn without training, has been taken as the measure of indirect cost of nursing training and has been added to the direct cost incurred on each trainee. That gave us the unit cost of nursing training.

Step 2

In order to estimate the incremental earning attributable to nursing training, it was started with age specific average monthly earnings which were available to the trainee at a point of time. These earnings were taken as the basis for determining the life time net benefit streams, allowances being made for the impact of secular growth of the economy and the incidence of unemployment. From the age specific expected average monthly earnings ($Y_t$), the researcher deducted the age specific foregone average monthly earnings ($Y_t'$) which could have been achieved, if the trainee would not have gone for training. This gave us the total monthly incremental earnings corresponding to each age ‘t’. After making deductions of total unit cost from incremental earnings corresponding to each age, we were left with the life time net benefit streams associated with the nursing training of women at the nursing colleges.
Step 3

Thereafter, direct unit cost and net benefits were discounted to a common point in time and compared to each other. The discount rate which equated the sum of discounted cost to the sum of discounted benefits is the required rate of return to investment in the nursing training.

Algebraically the rate of return was obtained by solving the following equation:

\[ V = \sum_{t=17}^{t=60} \frac{Y_t - Y'_t - C_t}{(1 + r)^{t-n}} = 0 \]

- \( V \) = Social rate of return
- \( Y_t \) = Expected earning
- \( Y'_t \) = Foregone earning
- \( C_t \) = Unit cost
- \( r \) = Discount rate

It is clear from the above equation that the lower / higher values of \( V \) are associated with the higher / lower values of \( r \). In other words, \( V \) varies inversely with \( r \). Moreover, since the denominators in the successive terms were raised to higher and higher powers, the effect of taking larger and larger values were equivalent to giving less weight to later ages.
In this way, a specific value of \( r \) makes the present value of net benefit stream equal to zero. Thus we arrived at a value of \( r \) by an iterative procedure, raising the discount rate when the discounted net benefits add to zero. The rate of return approach as a summary statistic of costs and benefits is shown with the help of the following diagram.

**FIGURE 3.1**

Graphically, rates of return can be seen as a summary statistic showing the relationship between the pluses (+) and minuses (-) in the figure 3.1. The more the pluses outweigh the minuses, the higher the rates of return to educational level in question.
The rates of return analysis has been based on the following assumptions.

1. Observed incremental earnings of the ex-trainees, at each level of training, represent wholly or partly the effects of nursing training.

2. Incremental earnings measure the marginal productivity of nursing training.

Although these assumptions were quite restrictive, yet these were not purely hypothetical. The difference in earnings cannot be attributed solely to difference in the duration or type of nursing training of ex-trainees at nursing colleges. It had been recognised that factors like mental ability, achievement drive, motivation, social class, family background, education of parents and self etc., all have some independent effect on the earnings of an individual. Rather than taking any rigid position on the issue of the contribution of nursing training in the differences in earnings of the ex-trainees at nursing colleges, the researcher had worked out four alternative assumptions which enabled her to examine the sensitivity of results with respect to changes in these assumptions. The proportion of incremental earnings attributable to nursing training can be taken by following assumptions:

<table>
<thead>
<tr>
<th>Assumption</th>
<th>% of incremental earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.25</td>
</tr>
<tr>
<td>B</td>
<td>0.50</td>
</tr>
<tr>
<td>C</td>
<td>0.75</td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Thus the contribution of socio economic characteristics of ex-trainees on productivity of any ex-trainee had been taken into account under the given four alternative assumptions for the rates of return of investment in nursing training at nursing colleges.

Inspite of the procedure of data analysis, percentage figures were also calculated for analysing the data regarding the socio economic characteristics under the heading of age, marital status, family background, family income, educational level of parents, family structure etc. of the 1000 ex-trainees of the nursing colleges.

The data regarding the present status of employment of the ex-trainees were also analysed under the different categories of trainees such as in government jobs, private jobs, self employment, further study, doing nothing etc. Percentage figures were calculated for determining the number of ex-trainees under each category of jobs.

**The Compound Annual Rate of Growth (CARG)**

The rates of annual compound growth have been calculated with the help of the following formula:

\[ r_g = \text{Antilog} \left[ \frac{\log P_n - \log P_0}{n} \right] - 1 \]
Where \( r \) is the annual compound growth rate and \( n \) is the number of years. \( P_n \) is the value in the \( n^{th} \) year and \( P_0 \) is the value in the initial year.

3.7 CONCEPTS AND SYMBOLS USED IN THE STUDY

1. G.N.M. (General Nursing and Midwifery)

General nurses who are professionally qualified by training for at least three years after secondary school. They help surgeons and physicians by looking after the patients, the operation theater etc. and are also qualified to conduct deliveries.

2. A.N.M. (Auxiliary Nursing and Midwifery)

ANM’s are trained for one and a half year after secondary school. They are mainly associated with ante natal, natal and post natal care of pregnant women and other aspects of maternal and child health.

3. M.P.W. (Multi Purpose Worker)

Their training is for six months only. They do all kinds of peripheral work like helping in wards, hospitals, malaria workers, public health workers, peripheral public education regarding health and family welfare programme.

4. Investment

Expenditure on nursing training, health and employment is termed as investment.
5. **Ex-Beneficiary**

A person who has obtained nursing training from an institution in Haryana state before 31.3.93.

6. **Institutional Service**

These include provision of facilities for boarding, lodging, education, vocational training aids and appliances and employment.

7. **Non Institutional Services**

Non institutional services are in the nature of extending financial assistance to individual nurse.

Both the institutional and non institutional services deal with nursing training and employment aspect of a nurse.

Explanation of symbols used in the study:

- \( U_c \): Unit cost of special education per trainee = \( \frac{\text{Total cost}}{\text{Enrolment}} \) = \( \frac{C}{N} \)

- \( N \): Enrolment of total number of nursing trainees/students.

- \( n \): Total number of teachers.

- \( N/n \): Student - Teacher ratio.

- \( T \): Total Teacher cost (salaries of teaching staff).

- \( C = T_c \): Total cost of special education (nursing training).

- \( C-T \): Total Non teacher cost.

- \( \frac{C-T}{C} \): Ratio of non teacher cost to total cost.

- \( T/n \): Average pay of the teacher.
T/N Teacher cost per student / trainee.

Y Total income.

A Age of the institution.

\( Y_t \) Earnings (adjusted for incidence of unemployment, economic growth) that an average nurse gets at the time of commencement of the training.

\( Y_t^/ \) Earnings (adjusted) that an average nurse at the time of commencement of the training is already in position to achieve at age \( t \), and as such the earnings foregone by a trainee are the measure of indirect social costs of training.

\( C_t \) Unit cost of nursing training in a year \( t \) measured in terms of per trainee direct expenditure on education of trainee and annual rental value of building and equipment.

\( r \) Social rate of return. It is that specific discount rate that makes the discounted values of net benefit streams equal to zero.

60 Assumed age of retirement from labour force.

17 Assumed average age of entering the training.

\( r_g \) Rate of growth.

\( P_n \) Value or observation in the \( n \)th year.

\( P_o \) Value or Observation in the initial year.
LIMITATIONS OF THE STUDY

1. The study is limited to eight districts of Haryana, namely, Ambala, Karnal, Gurgaon, Mahendargarh, Rohtak, Bhiwani, Hisar and Sirsa.

2. Political ex-beneficiaries have not been included in the sample.

3. The study covers only eight nursing training colleges (women) of the eight districts selected.

4. The study is restricted to 1000 women ex-trainees, 100 dropouts and all the heads and 16 teachers (two teachers from each college) of women nursing training colleges.

5. The study is confined to three years from 1991-92 to 1993-94 only.
NOTES AND REFERENCES


