CHAPTER 3

METHODOLOGY

STUDY AREA /SITE: Post graduate Institute of Medical Education & Research, Chandigarh, a referral centre for several northern states, and provides tertiary care, and emergency medical, surgical and intensive care services and one of the most prestigious medical institutes of national importance was selected for the study. The master plan of PGIMER is appended in Annexure F.

SAMPLING/SAMPLE SIZE: PGIMER was purposely chosen as the study site because of the feasibility considerations.

STUDY TOOLS: The investigator used the following tools for the study:

- Observations
- Interview proforma (interview of the authorities, patients and their relatives, doctors and paramedical staff)
- Tests- laboratory, environmental etc.
- ISO: 14000 proforma
- Record analysis

STUDY DESIGN: The study used a blend of cross-sectional data collection and explorative research work.

MAIN SURVEY AND DATA COLLECTION: Both primary and secondary sources of information were used to generate data. Primary source included meeting people personally to know their views and to measure the level of awareness among different strata's of society about hospital environment related issues and their views as to how to solve the problem. Water and air samples from various locations of the hospital were analyzed. Noise level was recorded. Secondary information was generated from the past studies conducted on the subject and the related journals.
The following steps were involved in data collection: -

1. **Views of stakeholders**: An interview schedule was prepared covering various environmental parameters viz., air, water, noise and biomedical waste. The medical, paramedical and general public was interviewed with the help of schedule. Ten questions for each category of respondents were asked. Around 30 people were interviewed in each category. (Refer Annexure E, F, I & J)

2. **Noise Level Assessment**: The level of noise was monitored by the investigator herself during the peak hours of the day i.e. between 10.00 A.M to 11.00 A.M using digital sound level meter at various critical locations of the hospital.

3. **Effluent Water Quality Assessment**: There are 11 outlet points where the effluent is being discharged from the hospital (as marked on the master plan). The effluent sample was collected from these points and tested for following parameters as per ‘Standard Methods for the Examination of Water and Waste Water’, American Public Health Association, New York, 1971, APHA, AWWA & WPCF Publication.
   1. pH
   2. TSS (Total Suspended Solids) mg/l
   3. Oil & Grease (mg/l)
   4. BOD (Bio-chemical Oxygen Demand) (3 days at 27°C) (mg/l)
   5. COD (Chemical Oxygen Demand) (mg/l)
   6. Bio-Assay Test (% fish survived after 96 hrs.)
   7. Sulphate as SO₄ (mg/l)
   8. Chloride as Cl (mg/l)
   9. Ammonical Nitrogen as N (mg/l)
   10. TDS (Total Dissolved Solids) (mg/l)

   These 11 outlet points were identified after holding discussions with Hospital Engineer (Mtc.) and going through the old record. Chandigarh Pollution Control committee had also identified these outlets for testing.
4. **Air pollution status:** There are 16 fuel stacks attached to boilers, incinerator, and DG sets. The following details were studied by the investigator herself viz.

- Location
- Capacity
- Fuel type and quantity used per day
- Material of construction
- Shape
- Height and diameter
- Gas temperature
- Whether any pollution control device attached

The air emissions from these stacks were tested as per IS: 11255 for the following parameters:

- PM mg/m² at 12%CO₂
- SO₂ mg/m²
- NOx mg/m³

5. **Bio-Medical Waste Disposal System:** A visit was made by the investigator to the Institute’s incinerator and detailed discussions were held with the technician. Also, the study involved self-visits to various wards to ascertain the process of waste collection, segregation, and transportation. The garbage bin points were visited, and the sanitation staff was interviewed to have an in-depth picture of the B.M.W management system. A waste audit questionnaire (Annexure K and Annexure L) was used to determine the overall scoring pattern of B.M.W management in the Institute. A logbook maintained at the incinerator plant was also scrutinized.

6. **Conformance to ISO: 14000 certification:** A checklist was prepared incorporating all the components based on IS: 14001:2004 and IS: 14004:2004 series. The compliance to it by PGIMER was determined by self-analysis and by interviewing authorities. Differential scoring was awarded depending upon the conformance factor. The achievements of the Institute highlighted in the annual reports and other bulletins were also considered. The test reports of various environmental parameters were analyzed.
7. **Evaluation of HPH indicators:** After obtaining consent of hospital authorities, WHO self assessment tools for health promotion in hospital was used in this cross sectional study. Interviews of health care providers, patients and their relatives were conducted. Observations for HPH indicators were also considered. The tool sought information on 5 standards. Each standard was classified into sub-standards, comprising 13 in all. Each substandard was further supplemented by indicators quantifying sub standards comprising 18 indicators in all. (Annexure M).

In addition, on-the-spot observation in PGIMER campus was also done for 15 HPH indicators like green cover, noise level, safe water sanitation, traffic safety, aesthetic design of hospital architecture – natural light and ventilation, disabled friendly, seating facility, recreational and IEC activities, work place health promotion, health promotion services for staff, social and cultural activities for staff, welfare activities for staff and health promotion services for patients and their relatives.

A short questionnaire based survey of patients and their relatives was done after taking their consent. For the study, a total of 30 patients and their relatives were randomly selected from those visiting PGIMER. The questionnaire comprised of 2 domains: Satisfaction of respondents with health promoting services and whether they were counseled or educated about their disease, diet, hygiene and precautions & preventions to be taken. (Annexure N).

8. **Green cover:** On the spot observation and maps/masterplan of the Institute were also utilized to assess the green cover.

9. **Photographs:** Relevant photographs were also taken to document the status of environmental health in PGIMER.

10. **Review of Phased expansion of PGIMER, Chandigarh:** The growth of the institute since it was conceived has been documented.

11. **Analysis** of Department of Hospital Engineering and Planning’s environment related decisions.

12. **Analysis of various Policies/Acts** with respect to hospital environment in India.
STATISTICAL ANALYSIS: Graphs (line diagram), mean and range were used to present the data.

ETHICAL CONSIDERATION: All the respondents were informed about the purpose of study. Their consent was duly taken. Informed Consent Form appended in Annexure O. Only those willing to participate in the study were interviewed. They were assured that the information collected would be kept confidential and used only for the study.