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CHAPTER – IV

Analysis and Interpretation of the Data

4.1 Introduction

The analysis and interpretation of data is the most central phase in social science research. But then, the challenge faced by the social science researcher is to make sense of a massive amount of data, reduce the volume of information, identify significant patterns and construct an outline for communicating the spirit of what the data reveal. In qualitative data "few agreed on canons for these data analysis, in the sense of shared ground rules for drawing conclusions and verifying their sturdiness" (Miles and Huberman, 1984). There are no formulae for determining significance. There are no ways to perfectly reproducing the researcher's analytical thought processes. There are no straightforward tests for reliability and validity. In short, there are no absolute rules except to do the very best with our full intellect, to fairly represent the data and communicate what the data reveals by giving the purpose of the study.

However, it does not mean that there are no guidelines to assist in analysing qualitative data. But then again, guidelines and procedural suggestions are not rules. Applying guidelines requires judgement and creativity for the reason that each qualitative study is unique, the analytical approach used will be unique. As qualitative inquiry depends at every stage on the skills, training, insights, and capabilities of the researcher, qualitative analysis eventually depends on the analytical intellect and style of the analyst. The human factor is both the great strength the fundamental weakness of qualitative inquiry and analysis.

The main source of qualitative data collection is the 'Field' or 'Research Site'. When a researcher enters the field, almost every aspect of the field provides scope for qualitative data collection. For instance, the people and their interaction patterns, the social events, the cultural practices, the language and literature, the art and manufactured article, the general environments of the research site and the researcher's field notes and diary. Apart from these, the
archival materials also form another major source of qualitative data collection.

Analysis is also shaped by the genre framing our study. For instance, phenomenological studies are open-ended, searching for themes of meaning in participant's lives. Broad categories are sought, with sub themes to elaborate the topography of meaning. A feminist phenomenological study would search for the deep meaning of women's experiences - what are women's experiences of patriarchy, what role does oppression play in their lives, definite examples of discrimination and so on. Ethnographic studies generally begin with broad domains for gathering data that then shape analysis; they are balanced between structure and openness. Case studies are uniquely intended to capture the complexity of a particular event, programme, individual or place. They focus holistically on the organization or individual.

Analysis, then, proceeds logically and systematically from decisions made earlier on; it does not begin at some point in the study. Decisions made about the specific strategy, assumptions about knowledge and truth, and the genre most congruent with these decisions, all forecast analysis whether you analyse as you go on or hold off until the end of a study; whether you have stipulated analytic categories at the conceptualization stage or let them emerge; whatever the qualitative genera framing the study, the process of analyses are similar.

4.2 Components of Qualitative Data Analysis

Once the data analysis strategy is decided, the next task to be done involves three concurrent flows of activity - data reduction, data display, and drawing conclusion and verification (Miles Huberman, 1994). It may be mentioned here that these three activities are by no means exclusive and that they form a part of data analysis strategies. Brief explanations of those activities are as follows:
4.2.1 Data Reduction

If refers to the process of selecting, focusing, simplifying, abstracting and transforming the data that appear in written-up field notes or transcriptions. Data reduction is not something separate from analysis. It is a part of analysis. Data reduction is a form of analysis that sharpens sorts, focuses, discards and organizes data is such a way that meaningful conclusions can be drawn and verified.

4.2.2 Data Display

The second major flow of analysis activity is data display. Generally, a display is an organized, compressed assembly of information that permits conclusion drawing and action. Looking at display helps us to understand what is happening and to do something - either analyse further or take action - based on that understanding.

As with data reduction, the creation and use of display is not separate from analysis, it is a part of analysis. Designing a display - deciding on the rows and columns of a matrix for qualitative and deciding which data, in which form, should be entered in the cells - are analytic activities.

4.2.3 Drawing and Verifying Conclusion

The third stream of analysis activity is conclusion drawing and verification. From the start of data collection, the researcher in the field makes notes about the activities and their explanations. Subsequently these notes reveal some possible configurations from where tentative conclusions are drawn and they are verified and cross checked, while in the field, to check about the credibility of those conclusions.

1.3 Analysis of the Data

Quantitative data are obtained by using various scales or tests. The experiences of people are provided in standard responses to which numerical values are attached. These data are close ended and hardly provide any depth and detail.
Quantitative data are either parametric or non-parametric. Parametric data are measured data on interval or ratio scales of measurement. The marks scored by students in a test are an example of parametric data. Non-parametric data are obtained by applying nominal or ordinal scales of measurement. These data are either counted (enumerative) or ranked (ordinal).

Qualitative data are verbal or other symbolic materials. The detailed description of observed behaviours, people, situations and events, are examples of qualitative data. The responses to opened ended questions of a questionnaire or a schedule, first-hand information from people about their experiences, ideas, beliefs etc., and selected content or excerpts from documents, case histories, personal diaries and letters are other examples of qualitative data.

We make use of various types of techniques in the analysis of quantitative and qualitative data.

Statistical techniques have contributed greatly in gathering, organizing, analysing and interpreting quantitative (numerical) data. In the analysis of quantitative data with the help of statistical techniques, the researcher is required to understand the concepts involved in use and applications of these methods. Their strengths and limitations need to be understood so that there is no ambiguity in the use of these techniques. Quantitative data analysis techniques include the use and application of various descriptive statistical measures:

i) measures of central tendency or averages;
ii) measures of dispersion or variability;
iii) measures of relative position; and
iv) measures of relationship. Inferential or sampling statistics, with the help of various parametric and non-parametric tests, enable the researcher to make generalization or inferences about populations from the observations or measures of the characteristics of samples. Z - test, t-test, analysis of variance and co-variance, regression analysis, chi-square test, median test and Mann-Whitney U Test are examples of
some parametric and non-parametric tests which are widely used in the analysis of quantitative data.

Qualitative data in form of responses and narratives are analysed to study or discover inherent facts. These data are studied from as many angles as possible to explore new facts or to reinterpret already existing facts. Content analysis, inductive analysis and logical analysis are mostly used in the analysis of qualitative material.

Once the data have been analysed, the researcher can proceed to the stage of interpreting the results. The process of interpretation is essentially one of stating what the results show. It is not a routine and mechanical process, but calls for a careful, logical and critical examination of the results obtained after analysis, keeping in view the limitations of the sample chose, the tools selected and used in the study. There is always an element of subjectivity, which should be reduced to minimum by the researcher while interpreting the results.

The analysis of qualitative data is best described as a progression, not a stage; an ongoing process, not a one-time event. Marshall and Rossman (1989) explain, "Data analysis is the process of bringing order, structure and meaning to the mass of collected data. It is a messy, ambiguous, time consuming, creative and fascinating process. It does not proceed in a linear fashion; it is not neat. Qualitative data analysis is a search for general statements about relationship among categories of data; it builds grounded theory."

The interaction between data collection and analysis is one of the major features that distinguish qualitative research from traditional research. The researcher collects the first available data from the field, and immediately forms very tentative working hypotheses that cause adjustments in interview questions, observational strategies, and other data collection procedures. New data, obtained through refined procedures, test and reshape the tentative hypotheses that have been formed and further modify the data collection procedures. New data, obtained through refined procedures, test and reshape the tentative hypotheses that have been formed and further modify the data collection procedures.
This interactive refining process never really ceases until the final report has been written. This whole process is facilitated through the decision about data analysis strategies that have been decided early and the concurrent activities viz., data reduction, data display, conclusion drawing and verification help the researcher finally analyses and interpret the data.

However, before the so called 'final' (term given by Glaser and Strauss, 1967) analysis is attempted by the analyst, the following activities have been carried out which are mandatory in nature. The activities are

(i) Organization of data and
(ii) Familiarizing the data.

4.3.1 Organization of Data

The qualitative data gathered through open-ended questionnaires, in-depth interviews and participant observations are voluminous. Sitting down to make sense out of those pages and field notes seems pretty difficult. Therefore, before you actually begin the formal analysis, it is important to clean up and organize as you go along. It saves time, creates a more complete record, and stimulates analytical thinking.

The first thing to do is to make sure it's all there. Are the field notes ready? Be sure that you know where and when you took the field notes, who was there, and what the event was all about. Check to be sure that interview transcription is dated and who it was, whom you interviewed also be sure that you have written down hunches and analytic ideas throughout the study; this shapes and refines your thinking and provides insights for analysis.

Once the researcher is certain that all data are there, he/she has checked out the quality of the data, and has filled in any missing gaps, formal analysis can begin. It may be noted here, that since data are unique and priceless and it is not possible to obtain the same conversational or observational notes once again; for safety purpose it would be desirable to make at least a few copies. Once copies of the data have been made the formal analysis can begin. Since analysis of qualitative data is a creative process, there is no right way to go about organizing qualitative data is a creative process, there is no right way to go about organizing qualitative data.
Therefore, the data analysis techniques that will be discussed in this block will be suggestive rather than prescriptive.

4.3.2 Familiarizing the data

This is the most crucial aspect of data analysis process. Very often, due to our unfamiliarity with the data, we tend to drift along the way and get confused. Therefore, it is necessary for the researcher to read, reread, and once more read through the data. This intense and often tedious process enables you to become familiar with what you have learned in intimate ways. There is no substitute for transcribing. It familiarizes you with the data, provides leads for further data gathering, provokes insight, and stimulates analytical thinking. Furthermore, not all people are good visual learners or oral learners. So, transcribing is not a mere technical exercise, it caters to both types of persons. Thus this task requires extraordinary discipline on the part of the researcher.

Once the data has been collected, the collected data has been processed for data analysis. The analysis of data is very essential in any research work. Analysis is the word which talks about to the calculation of specific procedures besides examining the patterns of relationships which is presenting the midst of collected data. Therefore, the process of analysis, its associations or variances which are supportive or differing with the original hypotheses should be lay open to numerical investigations of significances which regulate with the validity of the collected data. The analysis of the data includes some numerous closely correlated procedures. The analysis of data has been executed with the intention of summarising the gathered data in addition to organizing them in the systematic way that they answer the research questions asked by the researcher.

The analysis and interpretation has been done from the inference derived from the collected data and by using appropriate research methodology, statistical techniques and skills. According to C. J. Aggrawal, "The analysis as well as interpretation of data represents the presentation of inferential/logical and illogical of the research procedure. Interpretations call for a critical examination of the result of one's analysis in the light of all the limitations of this data gathering and his subjective attitude."
This chapter is the heart of the research report as the last step of research primarily depends on the analysis and interpretation of data. The gathered data remains raw data until one makes analysis and interpretation. Proper statistical methods need to be used for the interpretation of data. The researcher has prepared proper tables for meaningful interpretation.

After the collected data have been analysed, the researcher has to go for drawing the inferences which has to be followed by report writing. The task of drawing the inferences should be done carefully. The researcher can expose relation and processes the underline those research’s findings through interpretation only.

Interpretation usually talk about the task of drawing inferences from the collected data only when is has been analysed. In short, we can say it is a hunt for research outcomes. It has two main features namely the determination to start continuousness in research by connecting the result of proposed study and to create some explanatory concepts.

Survey method has been selected for the current study. This method usually has been large sample for the reason that the measurement of response in general takes place to be low as 20 to 30%. Usually, survey method is apprehended with condition or relationships which exist or the opinion that are believed. It is concern with the procedures that are going on and effects that are obvious or tendencies which are emerging.

In the current study, investigator has used qualitative data for analysing the data. Qualitative data are words, that is, language in the form of extended text. They are at times direct questions from people, experts or entire passages from records and documents. There are no straight forward tests for reliability and validity. Analysis of qualitative data is the process of systematically organizing the information collected from the file. The researcher has analysed the questionnaire which has collected from 600 hundred students of secondary schools from Mehsana District. The analysis of data is done to serve the central purposes are as follows.

1. By making the raw data significant.
2. By examining the hypothesis.
3. To draw inferences or make some suggestions.
In order to attain the objectives and test the formulated hypothesis, both description and inferential statistics were used for analysing the data considering the following variables.

### 4.3.3 Analysis of the Present Data

In this section, the questionnaires marks of collected data have been analysed. The data collected from the IX standard students of secondary schools of Gujarati medium who follows the syllabus of Gujarat Board. The data are from granted and non-granted schools, urban and rural areas of Mehsana District of Gujarat state. The data of these schools have been combined and used as the data of controlled and uncontrolled groups. First of all, the data for the equalization of groups have been analysed which were based on the learners' questionnaires marks. Secondly, the data has been interpreted by statistical measurements. With the help of t-value. The data provides evidences to reject the null hypothesis.

In the current study, the investigator has used qualitative data for analysing the data. Qualitative data are words or is a language in the form of extended text. Qualitative data are generally stated or it could be other symbolic materials. Qualitative data are detailed explanation of observed behaviours, events, people and situations. This types of data are gathered by different methods and techniques like:

- Interviews
- Observations
- Opinionnaires
- Questionnaires
- Recorded data
- Inventories

In this current study, questionnaires are used as a procedures of data analysis and the questionnaires of the present study which are collected from the learners are analysed first. The data which are collected from the Gujarati medium students from Mehsana District of Gujarat follows the syllabus of Gujarat Board of Secondary School Examination. The data are
collected from both the areas urban and rural areas and they are from granted as well as and non-granted schools of Gujarat State..

These data of the Gujarati medium schools have been combined afterwards they are then used as the controlled and uncontrolled groups. The data from equal groups. So they have been analysed which were based on the pupil’s marks performances in the test.

The researcher in this present study has used self-made questionnaires to analyse and interpret the collected data. The variables of the collected are analysed through mean, SD and SED by using t-value.

4.3.4 Variables of the Study

Table: 4.1

The variables selected for the present study work are as follows;

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Type of variable</th>
<th>Variable</th>
<th>Comparison</th>
<th>Type Of Classifications</th>
<th>Techniques of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Independent variable</td>
<td>Gender</td>
<td>2</td>
<td>Male, Female</td>
<td>Self-made questionnaires</td>
</tr>
<tr>
<td>2</td>
<td>Independent variable</td>
<td>Area</td>
<td>2</td>
<td>Rural, Urban</td>
<td>Self-made questionnaires</td>
</tr>
<tr>
<td>3</td>
<td>Independent variable</td>
<td>Schools</td>
<td>2</td>
<td>Granted &amp; Non-granted</td>
<td>Self-made questionnaires</td>
</tr>
<tr>
<td>4</td>
<td>Dependent variable</td>
<td>Rural area</td>
<td>2</td>
<td>Boys, Girls</td>
<td>Self-made questionnaires</td>
</tr>
<tr>
<td>5</td>
<td>Dependent variable</td>
<td>Urban area</td>
<td>2</td>
<td>Boys, Girls</td>
<td>Self-made questionnaires</td>
</tr>
<tr>
<td>6</td>
<td>Controlled variables</td>
<td>Standard</td>
<td>1</td>
<td>Std.-9 Gujarati</td>
<td>Mehsana District of</td>
</tr>
</tbody>
</table>
4.3.5 Delimitations of the Study

The researcher has limited her study to the following grounds:

- This study is restricted only to secondary schools and their students.
- This study is limited only to the Mehsana district of Gujarat.
- This study is limited only to IX standard students.
- This study is limited only to Gujarati medium schools who follow the syllabus of Gujarat Board.
- This study is limited only to students studying in the academic session for the year 2014-15

4.4 Interpretation of the Data

Interpretation talks about the tasks of representation inference from the composed facts afterwards a logical or investigational study. It is a process.

(i) To make an effort to establish continuity in research through linking those of another.

(ii) To establish some explanatory concept. Hence interpretation can be defined as a process of drawing conceptual inference about the results, their meaning, significance and answer to the original problem.

Interpretation refers to the tasks of drawing inference from the collected facts after an analytical or experimental study. In the present study, the investigator has selected 600 students from different parts of Mehsana district of secondary schools from Gujarat. Out of about 1000 students only 600 students were randomly selected of 8 Gujarati medium schools who follow the syllabus of Gujarat Board.

A sample of 600 students (300 boys and 300 girls) of Gujarati medium secondary schools of Mehsana District of Gujarat those who follow the syllabus of Gujarat Board have selected for the study. The sample is taken from granted & non-granted and urban & rural areas of Mehsana District. The entire sample follows the syllabus of Gujarat Board.
Each school comprised 75 which have been selected randomly for the sample. Data's have been collected from 8 Gujarati medium secondary schools Mehsana District of Gujarat. The investigator has also collected the data from self-made questionnaires. The tests are closed ended questions. There are 70 questions and each question carry 1 marks each.

4.4.1 Statistical Techniques

Statistical Techniques of descriptive survey be responsible for a description of the data look like. They make available a resources to describe the points of mean, median and mode, central tendency and spreading that is to say variance, standard deviation and interquartile range. The below mentioned statistical procedure is used for the present study as follows:

- Mean, standard deviation and t-values are calculated for all the groups.
- The null hypothesis is rejected if the intended values of t are bigger than the significance at 0.05 levels of significance.
- The null hypothesis is excepted if the planned significance is less than the tabulated significance.
- The null hypothesis is rejected if the planned significance is more than the tabulated significance.
- The investigator has used the following statistical tools for the investigation of the statistics.

**Mean ($\bar{x}$)**

Mean of a fixed of observation or scores is attained by dividing the totality of complete values by the whole sum of values. It facilitates the investigator to compare two or more groups in terms of typical performance.

If in the circumstance of large data, the observations are arranged in a frequency distribution. When the data is grouped in a frequency distribution the below mentioned formula is used for calculating the Mean in such cases.

$$\text{Mean (or)} = M = \frac{\sum x}{N}$$
Where in

- The figure usage for mean noticeable as X bar

Σ = Sign of summary

x = Significance of ith element x

N = Complete total of observations or scores.

**Standard Deviation (SD)**

The standard deviation is the greatest general and stable measurement of variability. It is a positive square root of variance. An average of the square of deviations of the measures or scores from their means is known as variance which usually denoted as σ.

While calculating S.D. square, all the deviations are separated to find their sum and then divided the calculation by the total integer of the scores and at that time find the square root of the mean of the squared deviation. It is symbolised by symbol Σ.

\[ S.D = \sqrt{\frac{\sum x^2}{N} - \left( \frac{\Sigma x}{N} \right)^2} \]

Where in

S.D = Standard Deviation

X = Deviation of the raw score or measure from the mean.

N = Total number of scores or measures.

Σ = Symbol of summation.

**“t”-test (‘t’ value)**

“t”-test (‘t’ value) is built on t-distribution. It is a sound thought and a suitable investigation for refereeing the importance of the sample mean. The double samples are interconnected, as a result, corresponding t-test is used for mediating the importance of the mean of difference between two interconnected samples.

The statistical significant test, t is planned from the sample information and after that it is equalled with its probable assessment constructed on t-distribution at an indicated level of implication for equating degrees of freedom.
for accepting or rejecting the null hypothesis. t-test for variation in means and worked out further test statistics' ‘t’ formula is as under:

Where in

\[ X_1 = \text{Total of the squared scores from group 1} \]
\[ X_2 = \text{Total of the squared scores from group 2} \]

\[ n_1 = \text{Total numeral of marks from cluster 1} \]
\[ n_2 = \text{Total numeral of marks from cluster 2} \]

With degrees of freedom = \((n_1+n_2-2)\)

**Use of “t” test**

The investigator has tested the null hypothesis between two variables. The investigator has found the normal score of two groups of population. Found the co-relation at 0.05 level of significance.

**4.4.2 Evaluation of Test Data**

In this section, the questionnaires which are collected from students are analysed. Information collected from the data has been arranged accordingly into genders, areas and types of schools.

The investigator has used qualitative data survey method for data analysis. Qualitative data are gathered by a variety of methods but the investigator has adopted questionnaire method.

For analysing the data statistical, techniques used are mean (M), Standard Deviation (S.D.), Standard Error Difference (SED) and t- Value is calculated. The judgement was given on ‘t’ value at 200 degrees of freedom and at 0.05 level of significance. Once the research data has been collected and the analysis has made, the investigator has proceeded to the stages of interpreting the results.

**4.4.3 The Hypothesis**
The formulation of hypotheses is based on the objectives of the study, which need to be tested on the basis of evidence. This step establishes the problem and the logic underlying the research study. The proposition of a hypothesis is derived from theoretical constructs, previous researches and logical analysis. Formulation of the hypotheses helps in two ways:

(i) a well-grounded hypothesis is an indication that a researcher has sufficient knowledge in the area;
(ii) the hypothesis gives direction for the collection and interpretation of the data. A good hypothesis must be testable, have explanatory power, state the expected relationship between variables; be consistent with the existing body of knowledge; and be stated as simply concisely as possible.

In experimental type of research, a researcher is interested in making predictions about the outcomes of the experiment or what the results are expected to show. Hence, formulation of hypothesis is very important in experimental research. On the other hand, in the historical or some descriptive research, the researcher may be interested in investigating the history of an educational institution, the life of a man or the happening of an event and thus may not have a basis for making a prediction of results. Therefore, a hypothesis may not be required in such fact-finding studies. It may be noted that when the purpose of the research is to find facts as they exist, a hypothesis may not be required.

A hypothesis can be stated in directional or non-directional form. The hypothesis which provides the direction of the expected differences or relationships is termed as directional hypothesis. Suppose you are interest to study the impact of computer-assisted instruction on the achievement of high school students in mathematics.

Hypothesis is consisted of two words. One is ‘hypo’ means less then and the other is ‘thesis’. Thus hypothesis means less than or less certain than a thesis. Hypothesis means tentative solutions to a problem. It may be accepted or may not be accepted. The tentative solutions are tested basing upon the available evidence during conduct of as already are known to exist in a given area of research and to
guide the search for new truth. A hypothesis states what one looks for. Hypothesis may prove to be correct or incorrect. According to Hilway [1964, p. 123]:

Hypothesis may be conveniently considered as a tentative or working assumption, and the theory as the surviving or a final hypothesis, which is most defensibly supported by all the evidence. But since arrived at through the scientific method is subject to revision in the light of a new data, a theory is only one sense, always only a working assumption, so that the conventional distinction between hypothesis and theory (on the basis of increasing adequacy of evidence and hence of greater certainty) is a relative one.

Hypothesis is considered as a very powerful tool in research in order to achieve dependable knowledge. It helps to relate theory to observation to theory.

Hypothesis is nothing but suggested solutions to a problem. These suggestions may be rejected or retained.

4.4.4 Importance of Hypothesis

Hypothesis plays an important role in research. It aims at making predictions about some of the outcome of the study. If the hypothesis is not constructed, a researcher may waste much energy and time in collecting data and he cannot state facts clearly and detect relevant associations among variables. The hypothesis is very important in experimental research because the research predicts the outcome of the experiment. But in historical or descriptive research, the researcher seeks the facts for determining the status quo and may not have a basis for prediction of the outcome and hypothesis may not be required in such facts-finding studies.

- Hypotheses provide direction to the researcher.
- Hypotheses represent specific objectives and help researcher to determine the Type of data needed.
- It helps in selecting relevant facts.
• It provides basis for selecting the sample and research procedure, which are to be used in research work.
• It helps the researcher in delimiting the study.
• It is a way to process of thinking and discovery.
• It energizes the researcher in finding the outcome.
• It provides a clear and specific goal for research.
• It provides the clear idea about the problem, procedure and methods to be used for it.
• It facilitates extension of knowledge in an area.
• It gives tentative explanation of facts and phenomena.
• It provides the basis of reporting the conclusion of the study.
• It provides the rational statements.
• It presents indiscriminate gathering of data.
• It focuses research.

4.4.5 Characteristics of Hypothesis

Travers (1978, pp. 76-78) has suggested seven characteristics of a hypothesis.

1. **Hypothesis should be clearly and precisely stated.**
   The clear statement of hypothesis involves concise technical languages and definition of terms which are defined better than those in common language. Clearly stated hypothesis usually avoids the use of general terms.

2. **Hypothesis should be verified or testable.**
   Hypothesis should be framed in such a way that these can be tested or verified. Then only the hypothesis enables the researcher in reaching the outcome. If the hypothesis is not tested, it becomes difficult on the part of the researcher for drawing conclusions. The variables must be related which are capable of being measured.
3. **Hypothesis should state the expected relationship between variables.**

   The hypothesis should clearly state variables involved in the problem. These variables should be clearly defined which becomes easy for collection of data. The variables should be related in such a way that the respondents never feel difficulties in providing response otherwise research becomes ambiguous.

4. **Hypothesis should be limited in scope.**

   The researcher from the beginning creates so interest in research that he formulates hypothesis of global significance that becomes very difficult for measure and draw conclusions. Therefore, it is desirable to formulate simple hypothesis with high significance.

5. **Hypothesis should be consistent with known fact.**

   There are number of conflicting theories of learning and teaching. These conflicts arise partly out of failure of research works to produce hypothesis that are in agreement with facts, and are in conflict with the law of nature. Therefore, it is worthwhile to formulate hypothesis that resolve the contradiction.

6. **Hypothesis should be stated in simple terms.**

   Hypothesis should be always stated in simple terms. It helps one to understand clearly and becomes easy for testing. On the other hand, it provides a basis for a clear and easily comprehended report at the end of the research.

7. **Hypotheses selected should be amenable to testing within a reasonable time.**

   One should not select the problem that includes hypotheses that are not accountable to testing within reasonable time period. Time period is very important factor. If the hypotheses are clearly stated, the research can be completed in time considering the interest of the researcher.

4.5 **Hypotheses Evaluation**
Hypothesis is the central instrument in research. Hypothesis principal function is to suggest new experiments and observations. It helps the researcher to make possibility of the statements about population parameters. Hypothesis is a proposition or it can be said that a set of proposition set before as a justification for the incidence of selected particular group of phenomena which is either asserted simply as a conditional inference to monitor selected examination or recognised as exact possible in relation to established facts.

A statistical hypothesis is a supposition about a population parameter. There are two types of hypothesis which are as follows

4.5.1 Null Hypothesis

Null hypothesis is a hypothesis of indicating `no difference` or `no relationship`, it is a neutral type of hypothesis. It denies the existence of any systematic principles apart from the effect of chance. It assumes that none or zero difference exists between two population means. Null hypothesis is a statistical hypothesis, which is tested inside the framework of the probability theory. Symbolically, this hypothesis would be stated as $H_0: P = 0.5$

Null Hypothesis can be directional or non-directional form. It is also called testing hypothesis when a directional (declarative) or non-directional hypothesis is tested statistically by converting it into null from. A null hypothesis challenges the assertion of a declarative hypothesis.

4.5.2 Alternative Hypothesis

These type of hypothesis is an operational declaration of research hypothesis. The research hypothesis is the prediction derived from the theory under test. By rejecting or accepting null hypothesis, one arrives at the conclusions about the research hypothesis. Symbolically, this hypothesis would be stated as

$H_a: P \neq 0.5$

As a result, the relationship between research hypothesis ($H_1$) and the null hypothesis ($H_0$) is that when null hypothesis ($H_0$) has been rejected then research hypothesis ($H_1$) has been accepted. But in the beginning stage, the
researcher makes an affirmative statement, as a predication of solution that she/he proposes to test later. At the stage of statistical analysis of data, the research hypothesis is converted into null hypothesis. All statistical tests are the test for null hypothesis. Rejecting or accepting null hypothesis asserts that observed difference or relationship may result from chance errors due to sampling procedure.

The inference drawn as a result of testing the hypothesis is always uncertain. The null hypothesis asserts that there will be no difference between the means but some difference may always occur by chance, therefore when the obtained difference is greater, the null hypothesis cannot be accepted. The question arises as how much can be the difference because of change, an estimate of which is provided by the values given in statistical tables. If the obtained difference is bigger than the tabulated value then the null value, the null hypothesis is rejected. It is accepted if the obtained difference is found to have sufficiently small probability of occurrence. In either rejection or acceptance of null hypothesis but two types of errors are always involved. These are type I and type II errors, they are also called alpha or beta errors respectively. These two errors are so related that if efforts are made to minimize one error then chances of other errors increase.

In either rejection or acceptance of null hypothesis, two types of errors are always involved these are type I and type II errors, they are also called alpha or beta errors respectively. These two errors are so related that if efforts are made to minimize one error the chances of other errors erase.

The hypothesis is formed in the beginning are considered in the light of evidences obtained through the present study, so as to either accept or reject them. Following are the details of students studying in IX standard who follow the syllabus of Gujarat Board of Meshana District. There are five variables namely male & female, granted & non-granted, urban & rural, rural boys & rural girls and urban boys & urban girls which are interpreted and analysed by mean scores, ‘t’ value and S.D.
H$_{01}$ There will be no significant difference between the mean score of secondary school students with respect to male and female students of Mehsana District. Mean scores and ‘t’ value of male and female students are given in **Table: 4.2**

**Table: 4.2**
*Mean Scores and ‘t’ Value of Male and Female Students*

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SED</th>
<th>t- Value</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>300</td>
<td>36.96</td>
<td>7.83</td>
<td></td>
<td></td>
<td>0.14 N. S</td>
</tr>
<tr>
<td>Female</td>
<td>300</td>
<td>36.87</td>
<td>7.98</td>
<td>0.645</td>
<td>0.14</td>
<td></td>
</tr>
</tbody>
</table>

In the present study, by using column graph, the statistical evaluation of the data obtained from the questionnaires of the male and female students’ regarding the awareness of global warming (Table No. 4.2 and Fig. 4.1) provide sufficient evidence to accept the null hypothesis. There is no significant difference between the mean score of secondary school students with respect to male and female students of Mehsana District. Moreover, the mean difference (0.14) of secondary school students with respect to male and female students of Mehsana District. The obtained value (0.14) is less than 1.97 at 0.05 level, so the null hypothesis is accepted at 0.05 level.

The difference between the mean of the awareness of global warming test scores of male and female students is not significant. Hence, there is no significant difference in the means of the two samples. Thus, it is clear there
will be no significant difference between the mean score of secondary school students with respect to male and female school students of Mehsana District.

Fig.: 4.1  t- Distribution Column Chart Male and Female Students

VAR. Male and Female
MEAN.
Male -36.96
Female -36.87
\( H_{02} \): There will be no significant difference between the mean score of secondary school students with respect to granted and non-granted schools of Mehsana District. Mean scores and 't' value of granted and non-granted schools are given in Table: 4.3.

**Table: 4.3 Mean Scores and 't' Value of Granted and Non-Granted Schools**

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SED</th>
<th>t- Value</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granted</td>
<td>300</td>
<td>35.64</td>
<td>7.52</td>
<td></td>
<td>0.637</td>
<td></td>
</tr>
<tr>
<td>Non-granted</td>
<td>300</td>
<td>38.19</td>
<td>8.07</td>
<td>0.637</td>
<td>4.00</td>
<td>S</td>
</tr>
</tbody>
</table>

In the present study, by using column graph, the statistical evaluation of the data obtained from the questionnaires of the granted and non-granted schools students' regarding the awareness of global warming (Table No. 4.3. and Fig. 4.2) be responsible for sufficient evidence to reject the null hypothesis. There exists significant difference between the mean score of granted and non-granted schools students of Mehsana District. Moreover, the mean difference (4.00) of secondary school students with respect to granted and non-granted schools students of Mehsana District. The obtained value (4.00) is more than 1.97 at 0.05 level, so the null hypothesis is rejected at 0.05 level.

The difference between the mean of the awareness of global warming test scores of granted and non-granted schools students, is significant. Hence, there exists significant difference in the means of the two samples. Thus, it is clear that there exists significant difference between the mean score of secondary school students with respect to granted and non-granted
schools of Mehsana District. Non-granted secondary school students are better with compare to granted secondary school students

**Fig.: 4.2 t- Distribution Column Chart Granted and Non-Granted Schools**

VAR. Granted and Non-Granted
MEAN.
Granted = 35.64
Non granted = 38.19
$H_{03}$: There will be no significant difference between the mean score of secondary school students with respect to urban and rural areas of students of Mehsana District. Mean scores and 't' value of urban and rural areas are given in Table: 4.4

**Table: 4.4 Mean Scores and ‘t’ Value of Urban and Rural Areas**

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SED</th>
<th>t- Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Level 0.05</td>
</tr>
<tr>
<td>Urban</td>
<td>300</td>
<td>36.96</td>
<td>7.99</td>
<td></td>
<td></td>
<td>N.S</td>
</tr>
<tr>
<td>Rural</td>
<td>300</td>
<td>36.87</td>
<td>7.82</td>
<td>0.645</td>
<td>0.15</td>
<td>N.S</td>
</tr>
</tbody>
</table>

By using column graph, the statistical evaluation of the data obtained from the questionnaires of the urban and rural areas students' regarding the awareness of global warming (Table No. 4.4 and Fig. 4.3) be responsible for sufficient evidence to accept the null hypothesis. There is no significant difference between the mean score of secondary school students with respect to urban and rural areas students of Mehsana District. Moreover, the mean difference (0.15) of secondary school students with respect to urban and rural areas students of Mehsana District. The obtained value (0.15) is less than 1.97 at 0.05 level, so the null hypothesis is accepted at 0.05 level.

The difference between the mean of the awareness of global warming test scores of urban and rural areas students is not significant. Hence, there is no significant difference in the means of the two samples. Thus, it is clear that
there will be no significant difference between the mean score of secondary school students with respect to urban and rural areas students of Mehsana District.

**Fig.: 4.3. t- Distribution Column Chart Urban and Rural Areas**

- **VAR. Urban and Rural MEAN.**
  - Urban -36.96
  - Rural -36.87
H_{04}: There will be no significant difference between the mean score of secondary school students of boys and girls of rural areas of Mehsana District. Mean scores and ‘t’ value of boys and girls of rural areas are given in Table: 4.5

Table: 4.5 Mean Scores and ‘t’ Value of Boys And Girls Of Rural Areas

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SED</th>
<th>t- Value</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Boys</td>
<td>150</td>
<td>35.99</td>
<td>7.62</td>
<td></td>
<td>1.94</td>
<td>N.S</td>
</tr>
<tr>
<td>Rural Girls</td>
<td>150</td>
<td>37.74</td>
<td>7.94</td>
<td>0.899</td>
<td>1.94</td>
<td></td>
</tr>
</tbody>
</table>

By using column graph, the statistical evaluation of the data obtained from the questionnaires of the boys and girls of rural areas students’ regarding the awareness of global warming (Table No. 4.5 and Fig. 4.4) provide sufficient evidence to accept the null hypothesis. There is no significant difference between the mean score of secondary school students with respect to of boys and girls of rural areas students of Mehsana District. Moreover, the mean difference (1.94) of secondary school students with respect to of boys and girls of rural areas students of Mehsana District. The obtained value (1.94) is less than 1.97 at 0.05 level, so the null hypothesis is accepted at 0.05 level.
The difference between the mean of the awareness of global warming test scores of boys and girls of rural areas students is not significant. Hence, there is no significant difference in the means of the two samples. Thus, it is clear that there will be no significant difference between the mean score of secondary school students of boys and girls of rural areas of Mehsana District.

**Fig.: 4. 4 t- Distribution Column Chart Boys and Girls of Rural Areas**
There will be no significant difference between the mean score of secondary school students of boys and girls of urban areas of Mehsana District. Mean scores and ‘t’ value of boys and girls of urban areas are given in Table: 4.6

Table: 4.6 Mean Scores and ‘t’ Value of Boys And Girls Of Urban Areas

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SED</th>
<th>t-Value</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Boys</td>
<td>150</td>
<td>37.93</td>
<td>7.94</td>
<td>0.917</td>
<td>2.10</td>
<td>0.05</td>
</tr>
<tr>
<td>Urban Girls</td>
<td>150</td>
<td>36.00</td>
<td>7.94</td>
<td>0.917</td>
<td></td>
<td>S</td>
</tr>
</tbody>
</table>

VAR. Boys and Girls of Rural
MEAN.
Rural Boys -35.99
Rural Girls – 37.74

H₀₅: There will be no significant difference between the mean score of secondary school students of boys and girls of urban areas of Mehsana District. Mean scores and ‘t’ value of boys and girls of urban areas are given in Table: 4.6

By using column graph, the statistical evaluation of the data obtained from the questionnaires of the boys and girls of urban areas schools students’ regarding the awareness of global warming (Table No. 4.6 and Fig. 4.5) be responsible for sufficient evidence to reject the null hypothesis. There exists significant difference between the mean score of boys and girls of urban areas schools’ students of Mehsana District. Moreover, the mean difference (2.10) of secondary school students with respect to boys and girls of urban areas schools’ students of Mehsana District.
The obtained value (2.10) is more than 1.97 at 0.05 level, so the null hypothesis is rejected at 0.05 level.

The variance between the mean of the consciousness of global warming test scores of boys and girls of urban areas schools' students is noteworthy. Henceforth, there exists significant difference in the mean score of these two samples. Therefore, it is proved that there occurs significant difference between the means of students studying in secondary schools. The boys and girls of urban areas of Mehsana District who are the students of secondary schools. They students have more awareness of global warming with compare to girls of urban area.

Fig.: 4.5  t- Distribution Column Chart Boys and Girls of Rural Areas
4.6 Global Warming

The raising of collective awareness in a way is the vision of development which becomes complicatedly linked with conservation of the natural and cultural heritage whatever the approach is. As a result, empowering the people to act to use the resources of the country sustainably. This would lead to the acquisition of environmental literacy which will help in achieving the goal of environmental education and overcoming related problems, leaving a healthy legacy for the future generation.

Now a day’s, the training in the education structure is completely structured with awareness and particle education in schools imparting higher education. Even though several studies and projects have been conducted on improving the effect of global warming on the earth but no study has been carry out to explore the reasons behind the global warming on the environment. Henceforth, the researcher has verified the awareness of global warming among the secondary schools’ students in Mehsana district of Gujarat.

4.6.1 Global warming and Its Impact on Environment

Fig 4.6 Global warming

VAR. Boys and Girls of Urban
MEAN.
Urban Boys - 37.93
Urban Girls – 36.00
Global Warming is a teeth breaking problem and it can be possible when the greenhouse gases can't escape the earth's atmosphere. Generally, when the extra greenhouse gases then cause the earth's temperature to increase. Consequently, we lose both the poles and frequently all our coasts which causes melting of ice and there would be responsible for more rain. Global warming’s consequence on environment are as follows:

- Global warming creates the sea rise
- Global warming disruptions the food chain
- The water which helps the plants to survive and reasons some of the plants to perish.
- Animals who have a good talent to become accustomed to what happiness to plants. They possibly will also pass away.
- People will lose two sources of food that is plant food in addition to animal food.
- People may perhaps also lose their homes.
- Global warming destroys numerous gigantic forests.
- The pollution which origins global warming may bring more rain.
- Global warming is also instigating many more fire that destroy entire forests.
- Thousands of animal and plant species will be destroyed.
Animals and plants will unable to adjust quickly enough to the new conditions.

Extreme floods and droughts will cause serious effects on water resources, agriculture and foods activity.

Ocean has become warmer and sea levels are rising.

Melting of polar ice caps.

Small islands and Maldives are in danger.

Coastal areas like Netherland, Egypt, Bangladesh will be flooded.

Regional and seasonal pattern will change.

Summer will be longer and winter will be shorter.

Extreme weather conditions like floods and droughts are likely to occur more often.

The climate across the world effects may be more contradictory.

4.6.2 Characteristics of Global warming

Maybe global warming is the furthermost noteworthy environmental problem the world is facing now a day. Due to human activities, the greenhouse gas intensities are growing in the sky and are altering the arrangement of the atmosphere and warming up the earth. Climate scientists have forecast the occurrence of global warming for years. They also foreseen the opposing influences of global warming which are preliminary to occur around the world are as follows;

- Collective incidents of droughts in certain zones while flooding in other parts, Increasing oceans temperatures as well as sea levels.
- Melting of glaciers and decrease in mountain snowfall protection
- Increased severe weather events for example tornadoes and hurricanes
- Drying coral reefs
- Costal erosion and the loss of costal ecosystems.

4.6.3 Greenhouse Effects

Greenhouse effects is the procedure in which the concentration and discharge of ultra violet pollution by gases in the sky warm a earth’s lower atmosphere and surface. The greenhouse effect was revealed by Joseph
Fourier in 1824. Greenhouse effects was the first examined by S. Arrhenius in 1896. Following are the process of greenhouse effect:

- During photosynthesis, plants captivate carbon dioxide and discharge oxygen.
- Organisms breathe in this oxygen and give out carbon dioxide and which goes back to the plants.
• Usually, carbon dioxide and water vapour that surrounds the planet which allows the radiation from the sun reach the earth.
• The greenhouse effect also prevents some of the heat from being reflected back.
• They create the earth suitable for individuals to survive in.
• Without this, the earth could be burning hot.
• Without the greenhouse effect, the earth would be freezing.
• The greenhouse effect trap sun’s radiation like glass does in a greenhouse which are called the greenhouse gases.
• The resultant warming of the atmosphere is called the greenhouse effect.
• Without these gases, the earth would be far colder and largely covered by ice.

4.6.4 Climate Change

Variations in climate can influence from both natural happenings and human happenings. Instances of human-induced reasons of climate change consist of industrialised impurities and remains firewood, oil petroleum and gases. The warming of a normal yearly temperatures because of development and variations in the earth's albedo because of deforestation of tropical rainforests.

Fig.4.8 Climate Change
Deaths due to Climate Change

- Floods
- Heat waves
- More powerful tornadoes on the way
- Forests and wild fires
- Spread of infectious disease
- Weather related damages
- Effect of world's food production
- Disappearing beaches
- Loss of world's ecosystems
- Coastal wetlands
- Coral lightening & fragmentation
- Prompt climate change
- Disappearing glaciers
- Carbon dioxide releases intensification acidity of ocean waters
- Threat to winter sports industry
- Water shortage and additional deficiencies
- Accumulative ocean hurricanes and costal destruction
- The atmosphere is intensifying
- Warning to krill- food source of fish, seabirds, whales and seals
- Disappearing plankton that is bottom of the food chain

1.6.5 Impact of Global Warming

- Rise in the level of the sea.
- Melting down of Himalaya glaciers
- Monsoon pattern has changed
- Possibility of moderate rain are going down
- Low laying coastal areas could be flooded
- Mumbai and other coastal city like Chennai could suffer severe losses

1.6.6 Causes of Global Warming
• When we throw our garbage away then the garbage goes to landfill
• The garbage is sometime buried
• Cutting down trees
• Some other examples of using energy and polluting the air are
  Turning on a light
  Watching T V
  Washing or drying clothes
  Using a hair dryer
  Riding a car or two wheelers
  Heating meal in the microwave
  Using an air conditioner or heater
  Using fan iron
  Playing a video game

1.7 Different Reasons Responsible for Global Warming

Few environmental problems have been fraught with so many complexities as those involving air pollution controls. While some air pollution abatement efforts have been successful, for example, the reduction of particulate emissions-mainly soot and certain other substances from coal and oil-fired furnaces, many of the more difficult problems have not yet been controlled.

Fig.4.9 Where is Global Warming going
We have permitted machines, factories, and other human activities of various kinds to pour hundreds of foreign substances into one of the most fragile segments of the environment while having only vague ideas about their total effects. Air pollutants tend to be complex mixtures of chemical substances. They often undergo chemical changes in micro-seconds or several months after release into the atmosphere. The toxic hazards of many of them have not been completely studied and are not well understood.

**4.7.1 Causes of Global Warming**

There are various reasons for global warming for example different activities by human beings as well as animals and even birds.
Fig. 4.10 Causes of Global Warming

The causes of global warming as shown in (Fig. 4.10 Causes of Global Warming) The impact of global warming is due to rise in the level of the sea and melting down of Himalaya glaciers. Monsoon pattern has changed and possibility of moderate rain are going down, low laying coastal areas could be flooded, Mumbai and other coastal city like Chennai could suffer severe losses. The causes of global warming affect when we throw our garbage away then the garbage goes to landfill, the garbage is sometime buried, cutting down trees, some other examples of using energy and polluting the air are turning on a light, watching TV, washing or drying clothes, using a hair dryer, riding a car or two wheelers, heating meal in the microwave, using an air conditioner or heater, using fan iron, playing a video game

4.7.2 Reasons of Climate Change

The variations in climate can affect from both natural happenings and human happenings. The impacts of climate change as shown in (Fig. 4.11
Reason of Climate Change) examples of human-happenings reasonable for climate change which is consist of industrialised impurities. The remains firewood, oil petroleum and gases and the warming of a normal yearly temperatures for the reason or due to the development and variations in the earth's albedo because of deforestation of sultry tropical forest.

Fig. 4.11 Reason of Climate Change

Due to climate change many deaths in the world are possible. The reasons are floods, heat waves, more powerful tornadoes on the way, forests and wild fires, spread of infectious disease, weather related damages, effect of world’s food production, disappearing beaches, loss of world’s ecosystems, coastal wetlands, coral lightening & fragmentation, prompt climate change, disappearing glaciers, carbon dioxide releases intensification acidity of ocean waters, threat to winter sports industry, water shortage and additional deficiencies, accumulative ocean hurricanes and costal destruction the atmosphere is intensifying, warning to krill- food source of fish, seabirds, whales and seals and disappearing plankton that is bottom of the food chain.
4.7.3 Impact of Automobiles on Environment

Automobiles, though only one part of the overall problem, illustrate the frustrations that can be encountered in cleaning up auto exhaust as shown ([Fig. 4.12 Impact of Automobiles on Environment](#)). Modifications of the internal combustion engine to reduce one kind of emission led to an increase in another kind of emission almost as obnoxious. The emission control devices such as the catalytic converter, add greatly to the cost of the automobile thereby keeping outworn, high polluting an automobile on the highways.

![Fig. 4.12 Impact of Automobiles on Environment](#)

4.7.4 Impact of Electric Power on Environment

Electric power plants are among the most troublesome air polluters. Nuclear power plants as shown in ([Fig. 4.13 Impact of Electric Power on Environment](#)) low in air pollution emissions, are being built less rapidly than had been anticipated by planners due to public fear of other nuclear hazards from their operation. Thus, fossil fuel emissions from power plant stacks are increasing at a faster rate. Part of the power plant emission problem can be alleviated by burning Low-Sulphur fuel oil or natural gas and, where these measures are not feasible, by the installation of equipment to remove Sulphur
oxides and Sulphuric acids. This an expensive procedure, especially where high Sulphur coal is used. In general, nitrogen oxides remain unabated. Another major solution is to build power plants far removed from urban areas.

**Fig. 4.13 Impact of Electric Power on Environment**

![Image of electric power plant](image)

### 4.7.5 Impact of Carbon Monoxide on Environment

The main source of anthropogenic carbon monoxide is the internal combustion engine and so it has become the prime target for control procedures. Since other toxicants are simultaneously released, there is always the possibility that a method of lowering the concentration of carbon monoxide as shown in *(Fig. 4.14 Impact of Carbon Monoxide on Environment)* may increase the concentration of these. For example, supplying a stoichiometric air/fuel mixture to the internal combustion engine will give low carbon monoxide and hydrocarbon emissions, but high emissions of nitrogen oxides.
The principal technique evolved to reduce carbon monoxide emission has been the development of exhaust system reactors, which convert carbon monoxide to carbon dioxide, and hydrocarbons to carbon dioxide and water. There are two types of reactor: those that are catalytic and depend on platinum or palladium, or a mixture of both, and those that use a high temperature chamber. None of the catalysts available is entirely satisfactory. There are all poisoned by lead and sculpture compound which may be present in gasoline, and by ethylene dibromide which is added to leaded gasolines to prevent build-up of lead deposits in engines. They are also poisoned by organ thiophosphate compounds released from lubricating oil. It is even possible that platinum and palladium released from catalytic reactors into the environment may prove to be toxic. Certainly, water soluble platinum salts have harmful effects. High temperature chambers do not have any of these shortcomings but they are more expensive to operate because they increase...
fuel consumption. Other approaches to reducing carbon monoxide emission include improvements in engine design, development of substitute fuels and development of new power sources. None of these has so far proved entirely satisfactory.

4.7.6 Impact of Hydrocarbons on Environment

Control of hydrocarbon emission from transportation involves the same treatment of the exhaust fumes as does removal of carbon monoxide. In addition, loss of hydrocarbons shown in (Fig. 4.15 Impact of Hydrocarbons on Environment) by evaporation from the fuel tank and carburettor is reduced by installation of a collection system which eventually returns them to the fuel induction system.

Fig. 4.15 Impact of Hydrocarbons on Environment

Hydrocarbons emissions from stationary sources are controlled by use to afterburning, a adsorption, absorption and condensation. Afterburning completes the oxidation of the hydrocarbons to carbon dioxide and water. For adsorption, a bed of activated carbon is used this bed is periodically cleaned with steam, from which the hydrocarbons may be recovered following condensation. Where possible, the recovered hydrocarbons may be utilized for other processes. Otherwise, they may be disposed of by oxidation to
carbon dioxide and water. Absorption is achieved by passing exhaust fumes through a liquid in which the hydrocarbons will dissolve or become suspended. Again, they may be recovered for subsequent use or they may be eliminated by oxidation.

4.7.7 Impact of Oxides of Sulphur on Environment

Fig. 4.16 Impact of Oxides of Sulphur on Environment

Modifying the catalytic units in car exhaust systems to reduce Sulphuric acid production may involve changing the method of catalyst use, adding a Sulphate shown in (Fig. 4.16 Impact of Oxides of Sulphur on Environment) trap, or completely removing Sulphur from gasoline prior to its use. As far as coal burning, the main source of anthropogenic Sulphur oxides, is concerned, there are three possible ways of reducing emission. Firstly, one can use coal with a very low Sulphur content. Unfortunately, there are only a few regions where this is economically feasible. Secondly, Sulphur can be removed from coal by a water washing process. However, this is expensive and removes only pyritic Sulphur. Thirdly, coal can be gasified and the Sulphur oxides produced trapped by a suitable chemical reaction. This method looks the most promising but it is still fairly costly in operation.
Most of the methods employed to reduce anthropogenic emission of nitrogen oxides involve modification of the combustion processes involved. Reduced peak temperature, and/or reduced oxygen availability at this temperature, lowers nitrogen shown in (Fig. 4.17 Impact of Oxides of Nitrogen on Environment) oxide levels and this is the main approach used. Catalytic modification of exhaust fumes is difficult because it must be reductive, whereas removal of carbon monoxide and hydrocarbons is oxidative.

4.7.9 Noise Pollution at Airport
Noise affects both indoor and outdoor activities, workplace, schools, hospitals, recreation and the enjoyment of the countryside, but probably its most serious effect is on homes (Fig. 4.18 Pollution at Airport). The effect can be reduced and in some cases eliminated, by spending money, for instance on improving the design of jet engines, replacing affected buildings outside the noisy area, insulating buildings or by siting airports away from populated areas. Some of the costs fall on those affected by noise, some on the aviation industry, some on the travelling public and some on the government. But whoever pays, the question arises whether they are getting value for money. The individual affected can decide this for himself. But to answer this question for the community as a whole it is necessary to assess the cost of aircraft noise.

Fig. 4.18 Pollution at Airport

Three possible approaches to valuation can be identified. The first, which can be taken to view of the Noise Reduction Society is: “Whatever we can pay for”. Upon this understanding peace and quiet is a basic human right, noise is an evil which we should remove if we possibly can, and only lack of available funds is regarded as justification for not removing the nuisance. But to take this view either implies noise is the only social evil—which few people would accept—or expects that governments are likely to be short of deserving causes on which to spend their money. Money is, of course, for governments as for individuals, a means of rationing scarce resources.

The second view is that it is for government to decide, using expert advice if they see fit, what is the right sum to pay: and in so doing, they can in some way be regarded as representing the views of their electorates. This view leave open, of course, how governments should decide; sometimes it is
suggested that an appropriate value can be inferred from decisions previously made; but it is difficult to accept this suggestion unless one believes that those previous decisions have been soundly based—and impossible to accept it if, as often happens, the decisions turn out to have been inconsistent with each other.

The third view is that one should attempt to establish what individuals would pay to achieve freedom from noise, or what compensation they would require to put up with it, and use the aggregation of the values thus obtained over the whole affected population as an estimate of the total social cost of noise.

While this view too presents considerable problems, both conceptually and in practice, it appears more promising than the others. At any rate, it was the view adopted by the Commission on the third London airport. It is not clear whether this view was accepted or rejected by the Government, since the statement made by the Secretary of State explaining the Government’s reasons for rejecting the Commission’s recommendation is not explicit on this point.

### 4.7.10 Activities Affected by Noise

The action used by the directive for diverse events and events are affected by noise which is based on the principle of trying to forecast how these activities would react to the influence of noise. There are basically four alternative ways of reacting:

- Getting rid of the noise—for example, by insulation, which is clearly only completely effective if the activity is carried on entirely indoors.
- Moving the activity to an area unaffected by noise. This may involve several kinds of costs, both financial and subjective. They will include some or all of the following: the cost of the new site and buildings, the possibility of increased travel costs for those who continue to take part and the loss of value of the existing activity, for those who cease to do so.
- Going on doing it and suffering. In this case the cost will usually be subjective.
• Stopping doing it, in which case the cost is the loss of the value of the activity to those who take part.

The various activities affected by aircraft noise were treated by the Commission in rather different ways. For domestic housing for which insulation is not considered to be a satisfactory means of eliminating the nuisance, a model was developed which forecast the proportions of people who would move and remain, and the costs they would suffer—this model is described in detail below. For schools, hospitals and certain other public buildings, insulation costs were taken of insulation was economic; if not, it was assumed that the buildings would have to be moved. For commerce and industry in high noise zones some loss of efficiency was assumed and a cost calculated; in a few cases, it was assumed that a move would have to be made, with an allowance for loss of local trade. A variety of methods were used for calculating the effects of noise on outdoor recreation, including losses in enjoyment for those who continued to take part and loss of consumer surplus for those who would no longer take part because of noise. If an activity could readily be transferred elsewhere, the cost of moving and any longer journeys was estimated.

4.7.11 The Formation of Acid Rain

Acid rain is the outcome of human activities are mainly the combustion of fossil fuels (oil, coal, natural gas) and the smelting of Sulphide ores (Fig.4.19 The Formation of Acid Rain). These activities release in the atmosphere large quantities of Sulphur and nitrogen oxides, which when in contact with atmospheric moisture are changed into two of the strongest acids which is known as (Sulphuric and Nitric) and fall to the ground in rain and snow. The pH of rain and snow over large regions of the world ranges from 4.0 to 4.5, which is from 5 to 30 times more acid than the lowest pH (5.6) expected for unpolluted areas. The lowest rain pH's reported so far (2.4 in Scotland, 1.5 in West Virginia and 1.7 in Los Angeles) are more acidic than vinegar (pH 3.0) and of lemon juice (pH 2.2). It is estimated that about 70 per cent of the acid in acid rain is Sulphuric acid, with nitric acid contributing about 30 per cent. In addition to Sulphur contained in the acids carried in the rain, it is believed that an approximately equal amount of Sulphur reaches all
surfaces through dry deposition of particulate Sulphur. In humid or wet weather, this Sulphur too is oxidized to Sulphuric acid.

Fig. 4.19 The Formation of Acid Rain

The Formation of Acid Rain

4.7.12 Acid Rain and Other Pollution

The role of acid rain and other forms of air pollution is under intensive investigation. In spite of the dimensions of the forest damage as in Fig. 4.20 (Acid Rain and Other Pollution). However, a firm link has not been established. One can get some idea of the difficulties by contrasting the forest decline with clear-cut cases of forest poisoning by air pollutants. Smelters and
chemical plants that emit Sulphur dioxide, oxides of nitrogen or fluoride compounds are often girdled by dead timber. In such cases, there is a clear correlation between tree damage, a specific pollution source and a threshold concentration of the pollutant. The forests that are now dying, in contrast, are far from any source and are exposed to pollutants in concentrations well below the levels previously reported to injure trees. If air pollution and especially acid rain, plays a part in forest decline, it probably does so less as a lethal agent than as a stress.

Fig. 4.20 Acid Rain and Other Pollution

Many stresses, both biotic and abiotic, combine to affect the vigour of a forest. The trees’ genetic endowment or age can be a source of stress: a stand may be genetically weak or senescent. Other stresses may take such forms as diseases, insects, parasitic fungi, a shortage of light, water or essential nutrients and sporadic injury from events such as floods, high winds
and ice storms. Stresses easily withstood in isolation can combine with debilitating or fatal effects. A fatal sequence of stresses may begin with a “predisposing” stress, such as a shortage of nutrients. The tree may then be seriously weakened by an “inciting” stress, such as a severe winter. It is then defenseless against a final, “contributing” stress—the actual cause of death—such as disease or insect attack.

4.7.13 Population Explosion

A population is generally a group of people of some certain classes inhabiting a particular area at a particular time. Population ecology is the study of individuals of the same species where the processes of aggregation, interdependencies between individuals etc. and various factors governing such processes are emphasized. The increasing human population of the world could attract the attention of not only the ecologists but also of behavioral scientists and it has led to the development of such new facets in ecology as shown in Fig. 4.21 Population Explosion. Population are characterized with such characteristics as density, natality, mortality, rate of increase, dispersal, urbanization etc.

Fig. 4.21 Population Explosion.
The time has now come when many countries of the world find themselves on cross-roads, where one road leads to more children and the other to more food. The road leading to more children is full of starvation and malnutrition, as food is not available there for even the existing populace.

Adding more children would, therefore, mean spreading suffering, starvation and malnutrition. It would mean feeding rickety children on the dried breasts of hungry mothers. It would mean adding to the number of men with sunken eyes and hollow cheeks who may not be physically fit even to join out food-for-work programme. It would mean increase in sickness, as malnutritioned people are prone to many diseases. It would mean retarding industrial development, for all the capital and resources will have to be diverted to growing more and more food, and still the food would not be enough for all. Thus, the nation would never be able to pull itself out of the more of poverty, penury and privation.

We have to stop population explosion before it explodes us. We have to defuse the population bomb before it defused out women and children. But
that is easier said than done, for the task is so gigantic. It involves the changing of the attitudes of millions and millions of people who really do not fully understand and appreciate the statistics of starvation, and who do not know what nutritious food means in terms of health and longevity.

The magnitude of the problem can really be visualized if we examine our census data.

- Marriage should be compulsorily registered.
- The adoption Bill, drafted earlier, should be liberalized and enacted on a priority basis;
- The State should take steps for ensuring social security so that parents do not search for it;
- Amenities for medical termination of pregnancy should be available in rural areas;
- Proper use should be made of taxation laws to provide encouragements or discouragements for having bigger families;
- Population-control education should be given to all, as well as the member of parliament and the bureaucrats.

Independent of the law, strong family planning measures are the need of the day. Simultaneously mass media should be used for educating the public about the need of controlling the size of family. Population education has also to be taught as an important part of environment education programme and our slogan should be Schumacher’s moto- small is beautiful.

The 20th Century has witnessed an unprecedented growth in population and in technological fields. This has led to over consumption of non-renewable and renewable natural resources and production of waste beyond the carrying capacity of the environment. The load imposed by organized human societies upon Earth’s Ecological unit has grown up very huge that the three functions of an environment – ‘house’ so large that the three ‘disposal site’ – increasingly encroach upon each other. The continued human demands now far exceed sustainable yields such as arid and semi-arid lands.

Today, the Ecologists are not only interested in the delicate balance of ecosystems and the inter and intra-specific relationships that exist between various populations and communities but are also interested in man’s role in
the environment. There is a need to break off the academic barriers and to adopt an inter-disciplinary approach in order to bring together the vast fields of knowledge so that mankind and the environment both can be benefited.

The problem of pollution is increasing with the increase in the population along with the acceleration in industrialization. Of all the economic activities of the human being, industrial is the most dynamic. In the wake of industrial development residential quarters, demands for various commodities, vehicles, vehicular ways, variety of activities are increasing at fastest rate. In such a situation, the establishment of activities come up without planning; breaching even natural laws, resulting into the pollution of ecosystem through industrial effluents, wastes, gases and chemicals. It does not mean that the industrialization is an anti-welfare activity, however, it becomes anti welfare activity when the natural geographical laws are not followed. The sitting and setting of the industrial activity must be based on geographical ingredients which reduce the pollution considerably. The key process of pollution and rather aggravation lies in the fact of geographical conditions of the region. These are:

- Natural setting of the relief.
- Natural blowing of the wind.

As soon as monsoon winds enter the inner girdle, Mewar Industrial area of MadriPratapnag industrial area, pesticides, distillery welcome these while blowing over, the air is fully polluted and creates havoc to the residential areas of Khempura, Shastri Nagar, Kachh Colony, Ravindra Nagar, Arvind Nagar, Sunderwas and areas situated distance apart. At times smell of polluted air is felt even at Amba Mata, situated at the other end.

This polluted air when tries to pass out, it fails due to more height of local relief. Thus, when in the direction of prevailing wind system, the industries are located it pollutes the inhabited part and residents and route to this system have to suffer a lot. In winter the north-eastern monsoon blows from the north east through SukherUdyogVihar bringing polluted air to the city dwellers. In this case, due to saucer like relief the industries must be located outside the hill girdle.

**Natural Flow of Water**
No industry should be located near the course of natural flow of water. River Ahar is the principal water channel of the city and unfortunately is the most polluted one. It flows through the industrial hub of Udaipur viz. Mewar Industrial area of Madri. Soon after entering in the municipal limit, river ahar is polluted with the drain water of the city at many places. Near Pulan and Bhupalpura, brick kiln ash pollutes its water. After corssing the road bridge of Ahar the chemicals of waste colours from Ahar settlement joins the river, before touching the Sewashram Road bridge, it gets effluent of saw and rice mills. After crossing the railway bridge, it meets with the effluents of Pesticides and distillery; ultimately to accept the multitudinal effluent of Madri industrial area. Near the culvert of Kanpur village, the colour and reaction of flowing water is eye witness of the climax of pollution.

Due to this type of pollution water has become so polluted that even the animals do not drink it. What to say of drinking, it removes their skin in due course even if they sit in it as per their habit. Birds, while enjoying their flights dip in this water; after which they feel uneasy and ultimately die. The skin and stomach of human beings’ experience burning sensation due to even casual use of such water.

**Natural Dip of the Rock**

The effluent in the form of liquids and solids mix with the water. This water either stands stagnant in the ditches or flows in the natural rivulets, also percolates and moves with underground water. In the city from old station (Rana Pratap Nagar) to Kanpur village the underground water has been fully polluted. A few wells and hand-pumps are not being used for potable water.

**Natural Slope**

The natural slope is very important ingredient of pollution. It is related with the flow of garbage, dirt and industrial waste, draining from higher to lower altitude. The saucer like structure of the relief has made the city more susceptible to slope. The natural slope of Udaipur is concentric mostly, thereby collecting water at the central part. Being hilly, it has developed land locked setting with lakes. It has master stream of Ahar which flows from north-west to south, south-east and east to meet Udaisagar at the edge of the basin.
At both the ends of east and west directions of the saucerlie the lakes on the edge. On the eastern edge is situated Udaisagar lake and on the western edge there is a setting of a group of lakes, interconnected with each other. These lakes from north to south are FatehSagar, SwaroopSagar, Rang Sagar, KalaliaTalab and Pichola. This lake region is fully surrounded by hills and uplands from all the sides, having two major gaps. Of the two, one gap is of Sisarma from where river Sisarma meets Picholalake. The other gap is of Madar of FatehSagar. The FatehsagarPicholo strong wall forms the residential part of the City. The lake side slope is also inhabited, polluting the lakes.

**Dispersal**

It is the movement of human beings in search of food, shelter and physical reasons. It occurs in the three ways:

- Emigration
- Immigration
- Migration

1. **Emigration**
   
   Emigration involves the movement of person from one place of country to another for permanence residence. It a one-way movement and take place constantly, although become conspicuous during a particular season.

2. **Immigration**
   
   Immigration is the inward movement of a person to any place or country. It is also one-way movement, and take place constantly, although becomes conspicuous during the particular season.

3. **Migration**
   
   Migration involves the movement between countries of many different streams of people in patterns that are continuously changing over time. The migrants ‘themselves are not a homogenous group: some are true migrants, seeking to change their place of professional activities permanently, while others are students who may later become true migrants, but may also return home. Some movements are direct, others indirect. although close examination of the available data reveals many exceptions, the dominant
migratory flow is from countries at a relatively lower stage of economic
development to those at a higher stage (Mejia, 1980).

Urbanization dates back in the cultural history of man. It was an
attempt to protect his life from environmental and political hazards, increase
and expand his skills and extend his life expectancy and well-being.

Life in metropolitan zones and towns is harmless for health and richer
in possibilities for a better life compared with rural areas. Understandably,
therefore, the gradual process of urbanisation has, in recent decades,
exploded into city growth in almost all developing being.

4.7.14 Relationship Between Population & Environment

It was in the 1960’s that “population” and “environment” trapped the
attention of the public by the media projection of the image of “doomsday”
“population bomb” and “population explosion”. The main centre was Asia,
with India being the second largest in population, second only to another
Asian country – China. “Numbers” became the focus of attention for the
development world (Merch 1982).

As population grow, problems arise at three different levels of the
environment:

- The housing environment.
- The city environment.
- The regional environment.

1 The Housing Environment.

The housing environment of lower income groups are among the most
degraded and unhealthy living environments that exists. Between quarter and
a half of the inhabitants of most of the cities live in grossly substandard
houses share two characteristics. One is a lack of readily available drinking
water, sewers, garbage collection, and basic measures to prevent disease
and provide primary health care; therefore, many disease and disease and
provide primary health care; consequently, many disease and physical
disorders are endemic-diarrhoea, dysentery, typhoid and food poisoning. The
other is crowded conditions, which often mean that communicable diseases
such as tuberculosis flourish, usually aided by low resistance due to malnutrition.

Many shantytowns grow up on sites ill-suited to human habitation. Examples can be seen on hill prone to landslides in Brazil and Venezuela, on sandy desert in Peru, or on land prone to flooding in Brazil, Ecuador, India, Nigeria and Thailand.

Some lower-income group people resort to more desperate solutions. One is simply to sleep on the streets or in some public space, an estimated 100000 to 500000 people do so in Bombay. Another alternative is to rent a room or a bed; perhaps the cheapest are the “hot-beds” hostels in Calcutta. In it six men for each room rental fee for beds by the hour so that at least two people working in different shifts can use one bed each day.

2 The City Environment.

The world cities and urban areas with high concentration of industries, as well as motor vehicles and traffic flows undergo from toxic waste and greenhouse effects problems. Local climatic conditions can also aggravate the problems. Thermal inversion is common in the winter in such cities in Indian and Chinese cities. Certain southeast Asian cities have long periods in the year with little wind to help disperse air pollution, with high concentration of motor vehicles and an abundance of sunshine, photochemical smog becomes as increasing problem (Hardoy and Satterthwaite, 1987).

The problems that urban areas persist are most acutely felt in largest cities. There may be a size and density at which their advantages turn into disadvantages. In densely build-up and inhabited cities an accumulation of heat leads to “heat-islands”, which in tropical climates can be persistent and exceed the limits tolerable for the inhabitants. Heat island in cities are the result of heat storage in buildings, reduced evaporative heat loss from paved surfaces with quick run-off of water after rains, reduced wind velocities near the ground where people move and increased long-wave radiation from buildings and pavements.

The heat-island produce “dead-islands effect” in city zones which link between the increase of air temperature and the increase of excess deaths. Cities in tropical climate can easily turn into death islands when they are too large, dense with short distances between buildings and little green land.
Tolerable temperature during night and day can be readily exceeded so that inhabitants will succumb when weakened by diseases such as heart disease. Elderly people are particularly prone to untimely death because they are less able to cope with heat.

Heat in growing tropical cities may also increase the incidence of homicide and suicide, aggravated by alcohol consumption among younger age groups between 20 and 45.

The second most important cause of death in cities may well be malignant neoplasm’s aggravated by toxic substances in stagnant air, polluted with volatile irritants and toxic compounds from modern buildings and household materials, motor vehicles exhausts and industrial emissions. The acceptable daily quantities of these irritants may easily be exceeded where the polluted air is not regularly replaced.

Documentation of environmental problems in cities is too poor to indicate where problems are most acute or even to suggest the magnitude of the effects on health. The discharge on mercury contaminated wastes into water bodies has received much publicity because of the hundreds of deaths and disabilities it caused in Minamata, Japan. The same received much concern when thousands of people died in Bhopal, India and thousands were seriously affected.

In India, environmental problems tend to be better documented than elsewhere. In some Indian cities, domestic fires are a major cause of air pollution. One of the estimation proposes that domestic fuel burning generates about half of Delhi’s air pollution. An estimated 60 per cent of the residents of Calcutta suffer from respirational infections linked to air pollution, Bombay, Calcutta and Delhi also have major water pollution problems, problems they share with most Indian cities (Hardoy and Satterthwaite, 1987).

Alarming levels of airborne lead and Carbon monoxide have been noted along busy roads in many cities. Rubbish heaps build up on streets and sidewalks and become breeding grounds for rodents and disease sources; during rains, floating garbage often collects at bottlenecks and cause flooding.

3 The Regional Environment

An underlying theme of the 1970’s was the recognition that development is involving several dimensional conceptions that includes
economic and social aspects of national activity as well as related to population, the usage of natural resources and managing the environmental settings.

During the decade, a series of efforts were made to specify the relationship among people resources, environment and development as one means of indicating the conditions in which environmentally sound and sustainable development might be achieved (Tolba, 1982).

Growing population has directed relationship with the environment, since many continental and have their origins in population growth. The population has increased and the world’s natural resources have receded. The increase in world population exerts considerable stress on the earth’s resources. This is particularly true in the regions where population growth is fast and natural resources are scare. The relationship between population and natural resources could be illustrated continuous population development in the developing countries at a rate of 2.1 to 2.2 per cent per year which would require an increase in food supply available to them by at least 4 per cent annually. This could only be achieved through either massive import of goods or greatly stepped-up agricultural production. Both have their socio-economic, technological and environmental impacts, some of which could be negative.

Man, has forgotten the basic fact, that our natural resources are finite, that no life is independent and that only by not disturbing the harmony of nature, can life be sustained. But it is saddening that the selfish and the greedy human beings have destroyed the natural resources. Wastes are being dumped in the environment, beyond the carrying capacity, causing environmental destruction. The relationship between man and environment seems to be inconsistency. Population growth is also leading to a long term decline in rainfall by decreasing the land’s vegetation cover by deforestation or overgrazing in Africa.

In addition to depleting natural resources, human activity is now influencing the evolution of life itself. The proliferation of new species give rise to the great diversity of life on earth today. But as human demands on the ecosystem have grown extinctions of plants and animals have outpaced the appearance of new species which was never experienced before.
Our security and future well-being may be threatened more by the deteriorating relationship between ourselves and the natural ecosystem and the resources that sustain us than by the battles among countries. As the scale of human impacts on natural systems become evident, governments will be forced to make difficult choices – reducing automobile use or sacrificing forests, abrupt lowering of birth rates or a starvation. It also increased in death rates, one child a family programme or declining living standards (Wolf, 1985).

Accumulation of oxides of sulphur and nitrogen, discharged from the combustion of fossil fuels in automobiles and power plants may be destroying the forests of Czechoslovakia, Poland and West Germany even faster than axe and plough destroyed those of India and E.L. Salvador. Survey of West German forests, indicate that damage has increased from 8 per cent of the forested area in 1982 to 34 per cent in 1983 and to half in 1984.

Rising carbon dioxide levels, resulting from fossil fuel combustion could lead to a climatic shift – a rise in average temperature of several degrees in the decade ahead, that could disrupt production, reduce dependable water supplies and eventually jeopardize coastal cities and towns (Wolf, 1985).

The use of nuclear energy, in harnessed or unharnessed forms, points towards global cataclysm. The attained level of radiation over the whole world may not presently have been high enough to destroy life altogether; but nobody knows whether the level is already high enough to cause mutations of species. Extensive use of insecticides and pesticides, chemical fertilizers and for increasing farm productivity, are no less perilous when seen against their effects in changing the ecological balance.

4.7.15 Accountability of PolicyMakers

Policy-makers in ecological quality management is a continuous process, involving several groups of participants. The role of each group is conditioned in part by what the institutional framework of laws and public policies permits or encourages, and in part by individual perceptions, attitudes and motivations (Zisk, 1969). Therefore, even though the law may permit direct participation of the individual, such as through membership of committees or presentations at hearings, he may not take advantage of the opportunity.
Five groups of participants may be identified: policymakers (the ultimate decision-makers), government agencies (technical advisers and administrators), interest groups (for example, manufacturers’ associations, trade unions, or conservation societies), political parties, and unaffiliated individuals. The policy-makers are influenced in various ways by the other four groups either because they require technical advice or because they are subjected to political pressure. The different groups are also affected by each other in their respective attempts to gain influence.

In decisions relating to environmental quality, considerable reliance is placed upon the advice of professionals, notably engineers, biologists,
physicians, architects and planners as shown in the above emtioned (Fig. 4.22 World Quality Management Framework). This is because the problems involved are often highly complex, partly because the individual feels that the exercise of his own judgment may result in disastrous consequences, and partly because of the salesmanship of the experts themselves. The consequence has been the development of a technical élite which has assumed responsibility for identifying problems and recommending solutions. Its advisory role has been institutionalized within the administrative structure, with various departments or branches of departments being staffed by particular kinds of professionals. Consequently, fisheries agencies are typically staffed by fishery biologists, forestry agencies by foresters and water resources agencies by engineers. Their role, however, may not be confined solely to advice. They may also become policy advocates, either by drawing up agency proposals for acceptance by the elected official or by presentations through a professional society or other interest group.

4.7.16 Responsibility of Engineers and Public Health Officials

Engineers and public health officials both pay critical roles in environmental quality management. Both have a long tradition of involvement in this area. Problems resulting from alterations in the physical environment are traditionally referred to engineers, especially when such problems affect Man’s economic well-being. Therefore, engineers are usually called in to deal with alterations in the environment stemming from natural hazards such as floods, hurricanes, or earthquakes, or problems resulting from traffic congestion, industrial conglomeration or mining operations. In such examples, economic costs can be clearly identified, and since the problems seem physical in origin, the expertise of the engineer is regards as particularly appropriate (Gerstl and Hutton, 1966; Vallentine, 1967).

Public health officials have also been dealing with environmental quality problems for a long time (Brockington, 1961). The kinds of problems on which they work, however, differ from those involving engineers. Public health officials are mainly concerned with those aspects of environmental alteration that result in adverse effects on human health, such as the effects of disposal of industrial and municipal wastes into water bodies.
The two groups of professionals play similar roles in the policy-making process. They act as technical advisers and administrators, and sometimes as decision-makers as well. In these capacities, they are instrumental in defining the problems to be solved, determining the solutions to be considered and, frequently, in selecting the strategy actually-adopted. Inevitably in doing so they give expression to their views as to what society wants, and as to how it will react to what is provided.

4.7.17 Solution to Solve the Problem

The whole world has joined hands to eradicate the problems of global warming. Certainly, every nation should contribute their efforts to solve this issue.

Fig. 4.23 Saving the Environment

1. Turn off the computer or the TV when it is not using.
2. Take shorter showers and do not waste water. Heating water uses energy, so try to use running water to save energy.
3. Keep rooms cool by closing the blinds, shades or curtains to avoid the use of air conditioner or cooler.
4. Turn off the lights when it is not necessary or when you leave a room. Use LED bulbs.
5. Dress lightly when it’s hot instead of turning up the air conditioning. Or use a fan.
6. Dress warmly when it’s cold instead of turning up the heater. Keep the windows and doors closed.
7. Offer to help your parents keep the air filters on your AC and heater clean.
8. Walk short distances instead of using a ride in the car. Use bicycle instead of scooter or motor cycle.
9. Plant more trees and encourage others to grow more trees.
10. Recycle the resources or the waste materials or garbages.
11. Use public transport instead of private transport. Do soldiering if possible.

4.8 Conclusion

The analysis and interpretation of the data in every research work requires clean observations of calculations, there classification and categorization. The present research deals with Awareness of Global Warming among the Secondary Schools Students in Mehsana District of Gujarat of IX standard students. In this chapter, the learning abilities of males and females in granted and non-granted schools of urban and rural areas of Mehsana District has been analysed and interpreted by testing of formulated null hypothesis. The researcher first took the mean which followed by the standard deviation and finally calculated the t-value. After analysing all the data by using statistics, the researcher has interpreted 0.05 the level of significance which is presented in the table and then tested the hypothesis.

In this chapter, the awareness of global warming among the secondary schools' students in Mehsana District of Gujarat of males and females,
granted and non-granted, urban and rural areas, girls and boys of urban and rural areas has been analysed and interpreted by testing of formulated null hypothesis. The investigator first took the mean which followed by the standard deviation, standard error difference and finally calculated the t-value. After analysing all the data by using statistics, the investigator has interpreted 0.05 the level of significance for 200 degrees of freedom which is presented in the table and then tested the hypothesis.

The above results have given a clear picture of the awareness of global warming among the secondary schools’ students in Mehsana District of Gujarat which is restricted only to Gujarati medium students who follows the Gujarat Board syllabus.