Methodology

3. METHODOLOGY

The methodology followed to undertake the present study entitled **"Diet and lifestyle of obese children in the selected districts of Kerala and Tamil Nadu and the impact of Medical Nutrition Therapy"** has been given below.

A. Selection of Area

B. Selection of Sample

1. Anthropometric measurements of subjects

C. Conduct of Study

1. Formulation of questionnaire to elicit Socioeconomic status
2. Preparation of an interview schedule to elicit dietary habits and lifestyle pattern
3. Risk factor assessment

D. Administration of Medical Nutrition Therapy

1. Food weighment survey for the sub samples
2. Designing a power point to impart Nutrition Education
3. Assessment of nutritional knowledge
4. Imparting Medical Nutrition Therapy

E. Impact of Medical Nutrition Therapy

1. Assessment of Body Mass Index
2. Assess the knowledge gained

F. Analysis of Data

A. SELECTION OF AREA

Considering the good response, ease of communication and familiarity of the area the researcher selected schools from five districts of Kerala and Tamil Nadu. Kerala's healthcare system has gained international acclaim. The United Nations Children's Fund (UNICEF) and the World Health Organization designated Kerala the world's first "baby-friendly state" because of its effective promotion of breast-feeding over formulas. More than 95 percent of Keralite births are hospital-delivered. Schools and colleges are run by the government, private trusts, or individuals. Each school is affiliated with either the Indian

Certificate of Secondary Education (ICSE), the Central Board for Secondary Education (CBSE), **Kerala State Education Board or the National Institute of** Open Schooling (NIOS). English is the language of instruction in most private schools. while government aided schools offer English or Malayalam medium.

Tamil Nadu, the state of the Tamils, is one of the 28 states of India. It has made significant strides in improving the health status and increasing access to health care services in the last decades. Tamil Nadu is the eleventh largest state in India by area and the seventh most populous state. It is the fifth largest contributor to India's Gross Domestic Product (GDP) and the most urbanised state in India. The state has the highest number (10.56 percent) of business enterprises in India, compared to the population share of about six percent. It is one of the foremost states in the country in terms of overall development.

The districts selected for the present research were **Kottayam, Pathanamthitta, Allepey, Thrissur and Idukki** from Kerala and **Coimbatore, Erode, Tirupur, Salem and Nilgris** from Tamil Nadu. Public schools were selected for the execution of the study from all the eight districts except Idukki and Nilgris. Idukki and Nilgris were selected with the objective to explore the prevailing rate of childhood obesity among tribes and its contributing factors. Hence from these districts the tribal schools were selected.

Kottayam is a city in the Indian state of Kerala. It is located in central Kerala and is also the administrative capital of Kottayam district. Kottayam has an estimated population of 1,20,725, according to the 2010 census. The town is an important trading centre of spices and commercial crops. Allepey also known as **Allapuzha,** is a town in Allapuzha District of Kerala state of southern India. It is a town with picturesque canals, backwaters, beaches, and lagoons. It was described as the one of the places known as Venice of the East by Lord Curzon. **Pathanamthitta** district is the youngest district located in the southern part of Kerala. It was declared as the first polio-free district in India. The district is 10.03 percent urbanised. **Thrissur** formerly known as Trichur, is a city in Kerala. It is known as the 'Cultural Capital of Kerala'. It is

the fourth largest city in Kerala. According to data compiled by economics research firm Indicus Analytics on residences, earnings and investments, Thrissur is ranked as the seventh best city in India to reside in. **Idukki** district is one among the 14 districts of Kerala. The district headquarters is located at Kuyilimala in Painavu.

Coimbatore, also known as Kovai is the second largest city in Tamil Nadu next only to Chennai. **Tirupur** is a district in Tamil Nadu, formed in October 2008. This district is famous for the Tirupur banyans industry, Cotton market and Uthukklui butter. **Erode** is a city with an urban agglomeration and a municipal corporation. Erode is the fastest growing urban region in South India. **Salem** is a part of the Kongu Nadu, an ancient division of Tamilakam comprising the western Tamil Nadu. Almost completely surrounded by hills, Salem is at the base of the renowned tourist destination of Yercaud hills, which offers breathtaking views both along the ride up the hill and from the peak. **Nilgris** is one of the oldest mountain ranges, older than the Himalayas, located at the tri-junction of Tamil Nadu, Kerala and Karnataka. Nilgiris is India's first biosphere. It has been declared as one of the 14 hotspots of the world because of its unique bio-diversity.

Sampling design and sample size calculation should be provided

B. SELECTION OF SAMPLE

The term childhood is non-specific and can imply a varying range of years in human development. Developmentally, it indicates the period between infancy and adulthood. It generally refers to the age group of 6 to 11 years old. In common terms, childhood is considered to start from birth. In many countries there is an age of maturity when childhood officially ends and a person legally becomes an adult. The age ranges anywhere from 13 to 21, with 18 being the most common. Middle childhood begins at around age seven or eight, approximating primary school age and ends around puberty, the beginning of adolescence (WHO, 2004).

A total of 500 children both male and female in the age group of 5 to 10 years from each district were selected for the study. It comprises a total of 5000 students. Since the age group selected for the study ranges from 5 to 10

years, the students studying from 1st standard to 5th standard were selected for the study. The required information about the subjects were collected by purposive sampling method. Purposive sampling is confined to specific types of people who can provide the desired information, either because they are the only ones who have it or conform to some criteria set by the researcher (Umasekaran, 2006).

- **Anthropometric Measurement of the Subjects**

Anthropometry involves obtaining physical measurement of an individual and relating them to the standards that reflect the growth and development of the individual. The anthropometric measurements namely height and weight of all the selected subjects were taken by the investigator using standard procedures. These physical measurements are another component of the nutritional assessment and are useful for evaluating over nutrition or under nutrition. They can be used to monitor the effects of nutritional intervention (Mohan et al, 2000).

The common valuable measurements are height, head circumference, weight, skin fold thickness and other girth measurements (Nieman et al, 1996).

- **Height**

The subjects were allowed to stand straight on a flat floor against the wall without foot wear. They were made to stand such that their head, back, shoulders, buttocks and heals touched the wall and their heads were erect. A horizontal scale was gently placed over the head of the subjects without pressing and a mark was made on the wall. Distance between the position of the marked point and the floor was noted and the height was recorded for all the children nearest to the accuracy of 0.5 cm.

- **Weight**

The weight of all the selected subjects was recorded with ordinary light clothes and after removing their foot wear. The weight was recorded using the bathroom scale to the nearest accuracy of 0.5 kg. From the recorded weight and height of the subjects, Body Mass Index (BMI) was calculated.

- **Body Mass Index (BMI)**

Body Mass Index (BMI) is a key tool for relating a person's body weight to their heights, based on the result it can indicate over nutrition or under nutrition (Margolis, 1990). Quetlet's Index also known as Body Mass Index is considered as the ideal index to conclude if a person is being underweight, normal, overweight (or) obese. From the recorded height and weight, BMI values were calculated using the formula.

$$BMI = \frac{Weight(kg)}{Height(m^2)}$$

Body Mass Index (BMI) is acceptable for determining obesity for children two years of age and older. The normal range for BMI in children varies with age and sex. The Centre for Disease Control defines obesity as a BMI greater than the 95th percentile. It has published tables for determining this in children. (Seidell, 1991)

- **BMI Reference chart for children**

BMI values for adults are age independent for both sexes. In children, BMI changes physiologically with age and sex. The two main BMI charts that can be used as reference are National Centre for Health Statistics (NCHS) and Centre for Disease Control (CDC) charts. The calculated BMI of each child was compared with the standard percentile chart for children as prescribed by the Centre for Disease Control (2000) which is given in Appendix I and II. These values were used to infer the nutritional status of children and identify the obese subjects. Assessing paediatric obesity is not as straight forward as it may seem, but there is now a consensus that Body Mass Index (BMI) should be used for clinical practice and epidemiology. BMI values in children are much lower than in adults and BMI changes with age. So BMI cut offs to define obesity in adults are not appropriate for children. National BMI reference data are now available and are widely used and recommended (Reily, 2000).

>95th percentiles: obesity

Children falling in the above 95th percentile category were selected by purposive sampling.

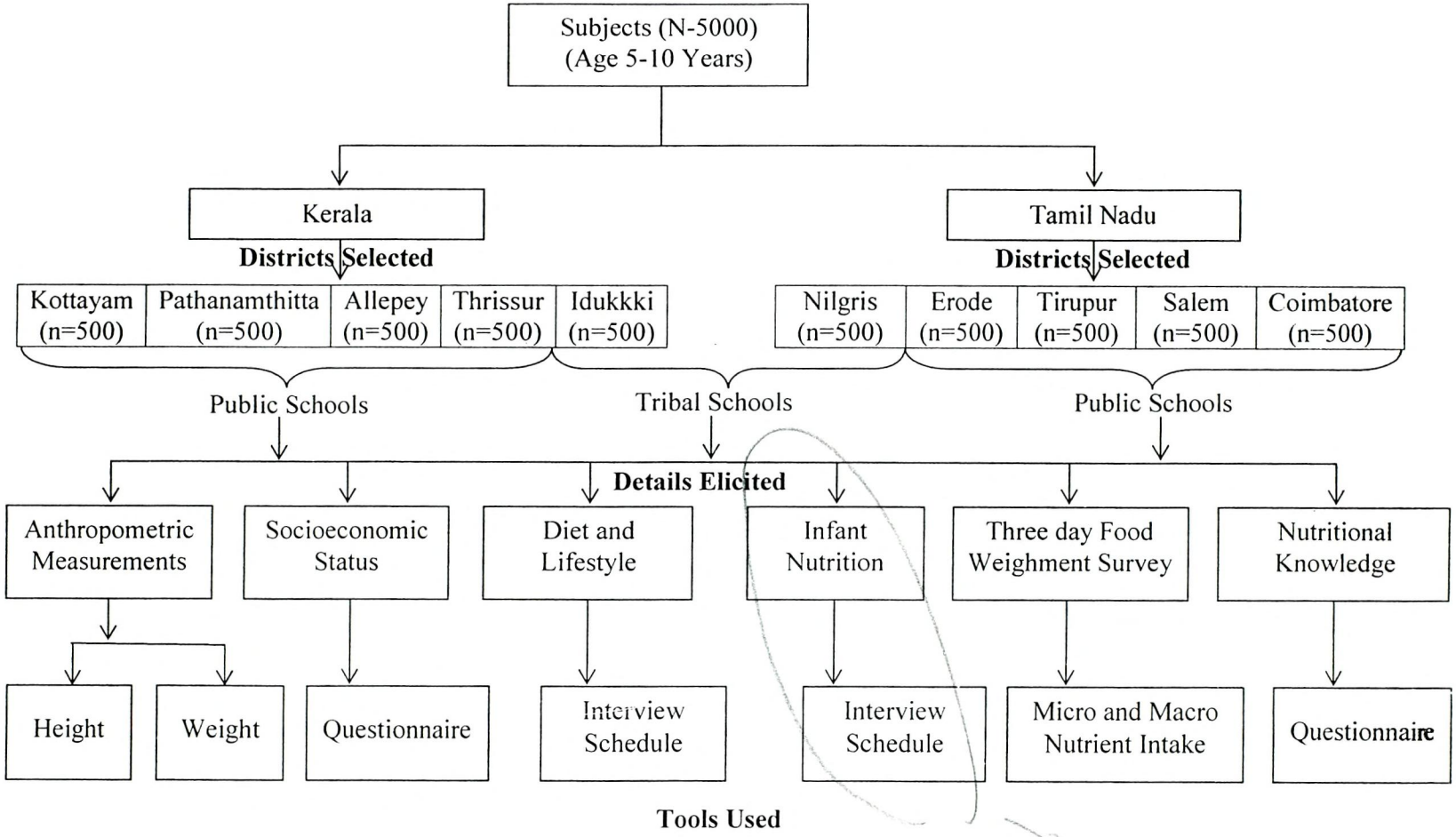

Figure i
FLOW CHART DIAGRAM OF METHODOLOGY

The details regarding the total number of children screened for obesity in the selected districts is presented in table (i)

TABLE (i)

TOTAL NUMBER OF CHILDREN SCREENED FOR OBESITY

Districts	Total no: of children screened
Coimbatore	1285
Erode	1832
Tirupur	2342
Salem	908
Kottayam	1881
Pathanamthitta	1374
Allepey	1733
Thrissur	1262

C. CONDUCT OF STUDY

The foundation of health for lifetime is laid in one's childhood. This is a crucial period to build a strong body and mind. Childhood as stated by WHO (2000) is the period from two years of age to 11 years. The prevalence of childhood obesity is on the uprise owing to urbanization and lifestyle changes of modern living. In order to fulfil the objectives of the study a questionnaire was formulated to elicit the background information of the children. A pilot survey was conducted in all the selected districts so as to analyse the feasibility of the research and based on the results the questionnaire was standardised. Anthropometric measurements were taken to identify the BMI and the status of body fat. The calculated BMI of each child was compared with the standard percentile chart for children (Centre for Disease Control, 2000) so as to infer the nutritional status of children and identify the obese subjects. Children falling in the above 95th percentile category were selected by purposive sampling and the well framed questionnaire was given to them. Purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. Power point presentation was developed to impart nutrition education.

1. Formulation of Questionnaire to Elicit Socioeconomic Status

Questionnaire is a structured set of questions usually sent by mail, though sometimes it is delivered by hand also. The hand delivery could be at home, school or college, office and organization. A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. It is described as a document that contains a set of questions, the answers to which are to be provided personally by the respondents (Ahuja, 2001).

The questionnaire was formulated (Appendix III) which embraces the details on demographic data which included address, religion, contact phone number, e-mail, area of residence, type of family, education qualification, occupation of the parents, monthly income, size of the family,

number of children and birth order of the child. The selected children's parents were explained the need and importance of the present study and were requested to fill in the questionnaire.

The number of dropouts in the selected districts was in the order of 53 from Coimbatore, 86 from Erode, 73 from Tirupur, 32 from Salem, 46 from Kottayam, 74 from Pathanamthitta, 42 from Allepey and 29 from Thrissur. With the objective to fill in the number of dropouts and to make up the number of obese subjects five hundred from each district the survey was conducted again by the researcher. Another questionnaire was formulated (Appendix IV) so as to assess the nutritional knowledge of the parents with special reference to functions of nutrients, sources of nutrients and dietary pattern.

2. PREPARATION OF AN INTERVIEW SCHEDULE TO ELICIT DIETARY HABITS AND LIFE STYLE PATTERN

Details on pre natal weight gain of the mothers, their complications during pregnancy, birth weight of the child, duration of breast feeding, initiation of weaning, types of food weaned ,the child's growth pattern, loss of weight and frequency of the child's visit to paediatrician during infancy were collected using an interview schedule (Appendix V). The mothers of the selected children were approached to elicit these details.

Details regarding the diet and lifestyle pattern of the selected subjects were elicited using an interview schedule (Appendix VI). Data collected on lifestyle pattern include physical activity pattern, type and duration of screen time, snacking habits during screen time, frequency of dining habits, duration of sleep and family history of obesity. The dietary pattern elicited included breakfast habits, details on skipping breakfast, fleshy food consumption, frequency of dining out, milk, fruits and vegetable consumption, commonly preferred outside foods, drinks and ready to eat foods.

Interview schedule is a face to face contact with the persons from whom the information is to be obtained. The interviewer asks questions pertaining to the data and collects the desired information. An interview schedule is an interview with pre-coded question to produce quick, cheap and

easy quantitative data which is high in reliability but low in validity. An interview is a conversation between two or more people (the interviewer and the interviewee) where questions are asked by the interviewer to obtain information from the interviewee (Kothari, 2001).

D. ADMINISTRATION OF MEDICAL NUTRITION THERAPY (MNT)

Medical Nutrition Therapy (MNT) is the development and provision of a nutritional treatment or therapy based on a detailed assessment of a person's medical history, psychosocial history, physical examination, and dietary history. It is used to treat an illness or condition, or as a means to prevent or delay diseases. The purpose of the assessment is to determine the persons' need for therapy, set parameters to plan a therapy, develop a therapy plan and determine the best method to initiate the therapy (American Dietetic Association, 2000).

According to Anderson (2002) Medical Nutrition Therapy has two phases such as medical management (which included lifestyle modifications, psychological support, drugs and surgery) and nutritional management (which comprised of dietary modifications and nutrition education). Drugs and surgery were avoided in the presence study considering the age group of the selected children. Medical Nutrition Therapy (MNT) refers to the assessment of the nutritional status of subjects with an illness, diet-related condition, or injury, in order to benefit the subject's own health and reduce health-care costs. Medical Nutrition Therapy includes setting goals for the patient's treatment and developing a specialized nutrition prescription that includes nutrition education and self-management training. According to Kafatos (2006), Medical Nutrition Therapy, which is also called therapeutic nutrition, has become an increasingly important component of integrated health-care systems (Kafatos, 2006).

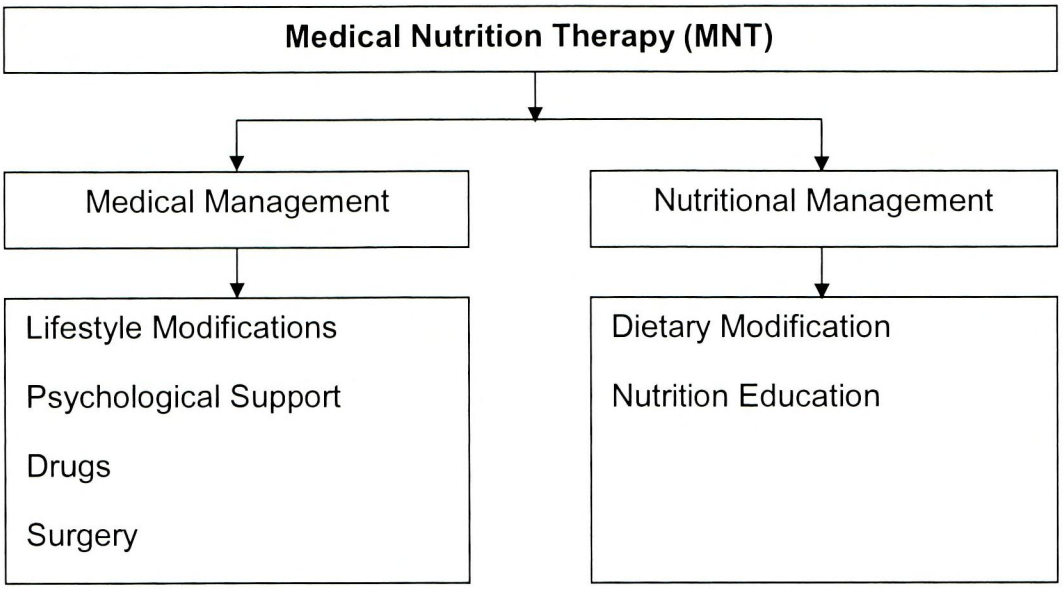

Figure II

Phases of Medical Nutrition Therapy

The process adapted in the present study included assessment of Body Mass Index, establishment of subject's self-management goals which is weight reduction, development of a nutrition plan, documentation, communication with the primary care provider which in the present study was the mother, evaluation, reassessment and outcome measurements. A food weighment survey was conducted for three consecutive days to understand the food consumption pattern of the selected children.

A key part of Medical Nutrition Therapy includes an assessment of the subject's current and past diet history. A dietary assessment is often conducted to determine the macronutrient (energy or caloric, protein, and fat) content and the micronutrient (vitamin and mineral) content of the patient's food intake. Some of the most common dietary assessment tools include food records, dietary recalls, food frequency questionnaires and diet histories.

Lectures were given for mothers on various aspects like need and importance of breast feeding, how to avoid complications during pregnancy, neonatal care, infant nutrition, need for physical activities in this cyber era, causes and complications of childhood obesity.

1. A Food Weighment Survey for Subsamples

Diet survey constitutes the most important part of any complete study on nutrition status of an individual or group. They provide useful information of the nutrient intake levels, source of nutrient and nutrition related behaviour of the community.

A food weighment survey was followed for three consecutive days to determine the macronutrient (energy or caloric, protein, and fat) content and the micronutrient (vitamin and mineral) content of the subject's food intake. This survey was done for selected 500 sub samples. Fifty subjects from each district were selected for food weighment survey by convenient sampling. In this method actual food consumption of the individual subjects were measured daily for three consequetive days to estimate the food intake of each individual.

2. Designing a Power Point to Impart Nutrition Education

The term "Power Point presentation" was coined when Microsoft introduced its software program PowerPoint. PowerPoint is commonly used by presenters as a digital aid when presenting the topic to an audience. Microsoft has called this type of software a "presentation", which is a misnomer.

The power point package focused on strategies namely ideal body weight of children recommended, physical activities, balanced diet, healthy lifestyle pattern and behaviour modification. Frequently asked questions (FAQ'S) were replied by the investigator

3. Assessment of Nutritional Knowledge

Association with health professionals from an early age, for weight management has been identified as an important strategy for effective management of obese children through counselling, encouragement and support. A pre-test was conducted to test the nutritional knowledge of the parents of the selected obese children with special reference to functions of

food and sources of nutrients and dietary pattern. The parents were asked to state true or false for the given set of questions (Appendix IV). Every correct answer was given one mark and the scores were summed up.

4. Imparting Medical Nutrition Therapy

A study on the dietary pattern of children and the nutritional knowledge of the parents was carried out. Educational materials were developed to impart sound nutritional knowledge and inculcate healthy eating habits. The tools developed for education included pamphlet, booklet and power point presentation. A power point presentation was formulated on various aspects of obesity such as causes, complications, dietary management and behaviour modifications. It also contained information's on food groups, food pyramids, nutrients needed for normal growth and management of obesity. Calorie, protein, calcium and other micro and macronutrients needed during childhood were also emphasized. This information was sent to the parents through e-mail.

In addition to the subjects overall medical history and specific evaluation of any diet-related illnesses or conditions, an evaluation on psychosocial data, including food-related attitudes and behaviors, sociological data, including cultural practices, housing, cooking facilities, financial resources, support of family and friends and general understanding of nutrition were done. The relationship of diet to the subjects condition, learning style, together with his or her readiness to modify or change behavior, current exercise and activity level were also studied.

There were many nonmedical issues that featured into planning appropriate dietary counseling and Medical Nutrition Therapy. Due attention was given to the subject's usual food choices, food likes and dislikes, cultural values, and the subject's ability to implement the dietary changes. In particular, the attitudes of other family members often influence the subject's compliance. Family members who are embarrassed by a subject's eating disorder were requested to make his or her eating patterns and balance weight fluctuations and focus on most of the family's interactions. These

focuses tend to reinforce the eating disorder rather than the Medical Nutrition Therapy.

Lectures were given for mothers on various aspects like need and importance of breast feeding, how to avoid complications during pregnancy, neonatal care and infant nutrition. Individual diet counseling was given to mothers of obese children. The parents were made aware of the causes of obesity, its complications, importance of the diet in the prevention of obesity and the need for physical activity in the cyber era. Different low calorie diets were also made familiar to the parents. The education was an interactive session between the investigator and the parents. Many queries were cleared during this interaction.

E. IMPACT OF MEDICAL NUTRITION THERAPY

The impact of Medical Nutrition Therapy given by the investigator was analyzed after a period of ten months.

1. Assessment of Body Mass Index

The Body Mass Index was calculated from the height and weight taken after a period of ten months. The present Body Mass Index was compared with the initial BMI taken in the first phase of the study and was statistically analysed.

2. Assess Knowledge Gained

Using the same pre-test questionnaire the impact of knowledge gained by the parents after nutrition education was post tested. This test was done after ten months. The knowledge gained after education was analyzed statistically. Statistics is the science of making effective use of numerical data relating to groups of individuals or experiments. It deals with all aspects, including not only the collection, analysis and interpretation of such data, but also the planning of the collection of data, in terms of the design of surveys and experiments.

F. ANALYSIS OF DATA

The information collected from the samples were consolidated. It was statistically analyzed by applying the chi square test, 't' test and analysis of covariance (ANACOVA). Pearson's chi-square (χ^2) test is the best-known of several chi-square tests – statistical procedures whose results are evaluated by reference to the chi-square distribution. Its properties were first investigated by Karl Pearson. It tests a null hypothesis stating that the frequency distribution of certain events observed in a sample is consistent with a particular theoretical distribution. The events considered must be mutually exclusive and have total probability one. A common case for this is where the events each cover an outcome of a categorical variable.