CHAPTER - III

METHODOLOGY

The methodology adopted in the current study is discussed under the following heads:-

3.1 Locale of the study
3.2 Selection of sample
3.3 Data base of the study
3.4 Period of study
3.5 Techniques of analysis
3.6 Limitations of the study

3.1 Locale of the Study

Coimbatore also known as Kovai is the second largest city in the state of Tamil Nadu. It is the administrative headquarters of Coimbatore District. Known as Manchester of Southern India, it is also a part of Kongu Nadu region of Tamil Nadu. Situated on the banks of the Noyyal River, Coimbatore is known for its textile factories, engineering firms, automobile parts manufacturers, healthcare facilities, educational institutions, pleasant weather, and hospitality and for its Kongu Tamil. Charming Coimbatore, also known as Kovai had its first origins, the Irular tribes of Kovan who settled in Kongunadu during the early times. Then this place was conquered by the Cholas and under the British reign ruled this place was named Coimbatore.

Coimbatore is surrounded by the Fairy Queen; The Nilgiris (the Blue Hills) in the north, the revolutionary Western Ghats side of Kerala in the west, newly formed Tiruppur in the south and south east, and the highly agriculturally commercial turmeric Erode District in the East. This highly progressive, entrepreneurial and commercial district of Tamil Nadu lies between 10, " - 10' and 11," -30' Northern latitude and 76," -40’ and 77," -30’ Eastern longitude. The district has a geographical area of 7469 sq.kms. With the formation of Tiruppur district in 2008, the geographical
area of Coimbatore shrank to 4,849.89 sq.kms. The district is divided into three revenue divisions, nine taluks, 19 blocks and 482 revenue villages.

Located in the rain shadow region of Western Ghats, Coimbatore enjoys pleasant weather throughout the year. The rich red loam soil and red sandy soil in the district are favourable for production of cotton and a wide variety of cereals and food grains, spices, and condiments. The region has a total cultivable area of 330,584 hectares. Forest coverage spans across 158,801 hectares and is primarily suitable for timber, mango, walnut, and silk cotton. The black soil, good rains and water resources had made this place a major agricultural centre. Cotton is grown in bulk and this made Coimbatore a textile city. Today Coimbatore is the Textile Capital of south India. The other major industries are machinery, automobile spares, motors, electronics, and steel and aluminium foundries. Now there are over 5000 small, medium and large textile mills.

Coimbatore City (Kovai) is one of the top 10 fastest growing cities of India. Coimbatore district has a population of about 34.73 lakhs (Census in 2011). The decadal growth rate of population during 1981-91 was 14.65 percent and during 1991-2001, it was 18.46 percent. Nearly 40 percent of the workers are in agriculture as cultivators, and agricultural labourers, 3 percent in household industry and 56 percent come under the census category of ‘other workers’. There are 1, 77,211 construction workers, 3, 97,614 agricultural workers, 70,255 workers in household industries and 13, 24,252 other workers (Census, 2001). The work participation rate is 46.62 percent. As per the estimates of Government of Tamil Nadu, the share of Coimbatore in GSDP (Gross State Domestic Product) of Tamil Nadu is estimated to be about 10 percent in 2006-07. Coimbatore District comprises major towns of Mettupalayam, Pollachi, Udumalpet, and Palladam. It is number one revenue district in the state of Tamil Nadu with revenues crossing more than Rs. 6000 crores per annum.

Coimbatore has been among the front runners in attracting a large amount of domestic and foreign industrial investments. The city is fast evolving into diversified activities such as engineering, textiles, power loom, hosiery, auto components, pumps, and motor sets. Rapid urbanization and improved standard of living is making the region one of the most preferred destinations for industrialization.
Coimbatore is also a commercial base for about 58,072 (as on May, 31, 2008) registered micro, small and medium enterprises. As per the Annual Employment Report of Coimbatore for 2007-08, only 3.4 percent of the population is employed in organized services. The unorganized sector plays a crucial role in the livelihood of the poor.

Coimbatore district is an educational hub of Tamil Nadu, with a large base of educational institutes. In 2007-08, the literacy ratio among males and females was about 55.5 percent and 44.5 percent respectively. The district comprises of a number of universities and schools including five universities, more than 1,400 primary schools, 420 middle schools and 165 higher secondary schools. Coimbatore is well connected with other cities and states through a vast road network across 322 kms of National Highways and 4,058 kms of State Highways. The three National Highways, NH-47 (Kanyakumari–Salem), NH-67 (Coimbatore–Nagappattinam), and NH-209 (Bangalore–Dindigul) pass through the city. The district has 20 railway stations with Podanur and Coimbatore North being the two prominent junctions. The rail network comprises both broad gauge and meter gauge with total route length of 211.7 kms and track length of 327.62 kms. Coimbatore also has an international airport at Peelamedu, which handles domestic and international passengers and various types of cargo. The nearest major port is located in Cochin.

3.1.1 Healthcare Services and Hospitals in Coimbatore

The city has number of hospitals. Apart from the Government hospital, several multi-facility hospitals function in the city. The district's health department is amongst the best in terms of implementing government-initiated health schemes. Coimbatore district is very rich in both public and private sector in healthcare service provided by hospitals, clinics, beds, and modern medical facilities etc., and the city has numerous hospitals. Apart from the Government hospital, several multi-facility hospitals function in the city. The district's health department is amongst the best in terms of implementing government-initiated health schemes. Also, several rare surgical procedures have taken place here. The polio eradication program is heavily assisted by the city's Rotary Clubs, who also regularly donate ambulances for smaller hospitals. The city also has numerous homoeopathic clinics run by NGOs.
Coimbatore is also the preferred healthcare destination to the floating population from nearby towns and districts and also nearby states of Kerala. The growth of the hospitals in the city can be attributed to the vision of the industrialists here to bridge the gap between growing health needs and the existing services. Many of the private hospitals in the city are promoted by industrialists as an extension of their business portfolio and their service to the society. The first healthcare centre started in 1909, later became the Coimbatore Medical College Hospital (CMCH) during 1960s.

Fast pace of industrialization, spiralling population and the increase in the health awareness have led to the growth of the healthcare industry in Coimbatore. The city stands second to Chennai in the Tamilnadu for highly affordable and quality healthcare deliveries of international standards. The network of Primary Health Centres (PHCs) in Coimbatore district is so well organized that no one needs to go beyond 15 kms, for getting Medicare. The supply side of the healthcare services in the Coimbatore district hospital is attached with government medical college.

Notably, majority of the big private players in the city are registered as trust hospitals. The ushering of the corporate multi specialty hospital a decade ago has intensified the competition among the private hospitals. This intense competition has necessitated advanced medical technology and better patient care. Few of the super specialty hospitals in the city have also slowly moved into specialties like cardiac care, cancer treatment and eye care. Amidst the super specialty and multi specialty hospitals also function at wide range of specialty hospitals. To maintain and extend their patient base, few of the hospitals have also added on other disciples that can be accommodated with the existing specialties. Patients who used to travel to other metros now have healthcare deliveries at their doorstep. Apart from providing healthcare services of international standards, hospitals in Coimbatore are also trendsetters. When hospitals in Mumbai and Bangalore are in the infant stages of establishing hospital networking, hospitals in Coimbatore have already taken a lead. Hospitals here are also engaged in emergency networks, clinical trials and other new concepts that are explored by the hospitals elsewhere in the country to increase the patient base and satisfaction. Private hospitals in the city have also joined with
NGOs in community service by establishing trauma care centres and emergency networks.

The Healthcare Industry in Coimbatore has witnessed a tremendous growth in the last decade. With the increasing demand for best treatment and best facilities, the Coimbatore hospitals have established themselves. Surprisingly, Coimbatore has the sophisticated large hospitals offering the world class quality treatments equivalent to the best hospitals around the world. The number of Coimbatore hospitals delivering healthcare to the masses is increasing every day. Coimbatore charity trusts have ensured that the district has a unique place in healthcare industry. Coimbatore is all set to emerge as one of the important hub for medical tourism. The well developed and multifaceted hospitals of Coimbatore are Kuppusamy Naidu Hospital, PSG Hospitals, the Kovai Medical Centre and Hospital (KMCH), KG Hospital, Ramakrishna Hospital, GEM Hospital and Ganga Hospital. On other hand Ayurvedic, Homeopathy Clinics, Naturopathy hospitals, Siddha Hospitals, and Acupuncture treatments are also emerging with innovative ideas to treat the people with their ancestral knowledge.

Thondamuthur Block

Thondamuthur block is a revenue block in Coimbatore district of Tamil Nadu. It is located in Narasipuram Road, approximately 15 km from Coimbatore City. The nearby villages are Thennamanalur, Vedapatti, Sundapalayam, Narasipuram, Poochiyur, Devarayipuram, Viraliyur, Mathampatty, Pooluvapatty, and Alandurai. As per 2011 Census, Thondamuthur has a population of 124,390. Males constitute 52 percent of the population and females 48 percent. Thondamuthur has an average literacy rate of 68 percent, higher than the national average of 59.5 percent with the male literacy being 79 percent, and female literacy is 56 percent. In Thondamuthur, 15 percent of the population are under 6 years of age. The total agricultural labour of Thondamuthur block is 11314 of which 10668 were males and 646 females. The network of Primary Health Centres (PHCs) in Thondamuthur block is so well organized that no one needs to go beyond 15 kms, for getting medical care. It has three primary health centres in Kaliveerampalayam, Pooluvapatty and Karadimadai. Each PHC operates through different sub centres located in different villages in the Thondamuthur block. In the delivery of healthcare facilities to the marginalized
groups, Thondamuthur block has created a distinct name in the health map of Coimbatore district by organising medical camps, creating awareness about healthcare and educating people in undertaking pre-natal and post-natal care and having a well equipped hospital with adequate staff to handle emergencies. Besides there were numerous private clinics or private health centres’ (PHs) located in Thondamuthur block serving the population. Hence for the present study Thondamuthur block was selected.

3.2 Selection of Sample

Multi stage random sampling design was adopted in the study for selecting the sample. The population of the study initially consisted of all primary health centres in Thondamuthur block, Coimbatore. The Thondamuthur block has three primary health centres located in Kaliveerampalayam, Pooluvapatty and Karadimadai. In the first stage all the three Primary Health Centres (PHCs) located in this block were selected.

Each PHC operates through different sub centres located in different villages in the thondamuthur block. In Kaliveerampalayam primary health centre there are five sub centres covering a total population of 46,672. Similarly, in Pooluvapatty primary health centre there are seven sub centres covering a total population of 43,044 and in Karadimadai there are five sub centres covering a total population of 46,325. In the second stage in each primary health centre two sub centres were selected giving due representation to the distance from the primary healthcare centre. Thus, one sub centre located very close to the primary healthcare centre and another sub centre which was located at maximum distance away from these centres was selected. Thus the village close to the primary healthcare centres includes Poochiyur, Alanadurai and Mathampatty and those villages lying far away from these primary healthcare centres includes Narasipuram, Sadivayal and Chettipalayam.

During the pilot study it was found that despite the availability of well equipped primary health centres, some people still prefer to use private healthcare facilities for meeting their healthcare needs. Hence to identify the utilization pattern of healthcare services and reasons for preferring private hospital (PHs) over PHCs,
the sample was enlarged to include respondents using PHCs and PHs. In the third stage, from these selected sub centres 600 samples were selected randomly, of which 390 households were utilizing PHCs healthcare services for treatment and 210 households were availing PHs healthcare services from private clinics, private hospitals, trust hospitals etc near to their residence. The cross verification of the data was done in order to ascertain its reliability, adequacy and consistency of the data. Data of 13 households are deleted because after cross-checking they found irrelevant. Hence, our sample size confined to 587. The schematic representation of the sample design is presented in figure 3.1
Selection of the PHCs

PHCs in Thondamuthur

Kaliveerampalayam

Pooluvapatty

Karadimadai

Selection of the Sub Centres

Poochiyur

Alandurai

Mathampatty

Selection of the Samples

PHCs (147)

PHs (84)

PHCs (134)

PHs (57)

PHCs (109)

PHs (69)

Note: Blue denotes Faraway Sub centres

Red denotes Nearby Sub centres
3.3 Data Base of the Study

Data pertaining to the study were collected by personal interview method. The interview schedule consisted of questions relating to the socio-economic profile of the households, health status, healthcare services utilisation, healthcare expenditure and its source, their awareness and willingness to pay regarding health insurance. The schedule was first pre-tested with few selected sample units and based on their responses the questions were reformulated and the final interview schedule was administered. This is given in Annexure I.

3.4 Period of Study

Data for the study were collected from the sample units by administering a pre-tested interview schedule during the period October 2011-January 2012.

3.5 Techniques of Analysis

Besides averages, percentages and graphs, the following techniques were applied.

3.5.1 Chi-square test

The $\chi^2$ test is one of the simplest and most widely used non-parametric tests in statistics. The quantity $\chi^2$ describes the magnitude of the discrepancy between theory and observation and is symbolized as:

$$ \chi^2 = \frac{\sum (O-E)^2}{E} $$

Where O refers to observed frequency and E refers to expected frequency.

In the present study, Chi-square test was applied to find the association between the overall health status and socio-economic factors like gender, age, marital status, education, occupation and monthly income.
3.5.2 Multiple Regression Analysis

Multiple regression analysis is a statistical technique which is used to analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables. Its basic formulation is

\[ Y_1 = b_0 + b_1X_1 + b_2X_2 + \ldots + b_nX_n + e \]

where \( Y_1 \) – dependent variable, \( X_1 \ldots X_n \) – independent variables, \( b_0 \) – intercepts, \( b_i \) - coefficient of the independent variable (\( i = 1,2,\ldots,n \)) and \( e \) – random component.

Multiple regression analysis was applied to determine the factors impacting healthcare expenditure among the sample respondents.

3.5.3 Discriminant Analysis

Discriminant analysis involves deriving a variate. The discriminant variate is the linear combination of the two (or more) independent variables that will discriminate best between the objects (persons, firms, etc) in the groups defined a priori. Discrimination is achieved by calculating the variates weights for each independent variable to maximize the differences between the groups (i.e., the between group variance relative to the within group variance). The variate for a discriminant analysis, also known as the discriminant function, is derived from an equation much like that seen in multiple regressions. It takes the following form:

\[ Z_{jk} = a + W_1X_{1k} + W_2X_{2k} + \ldots + W_nX_{nk} \]

\( Z_{jk} \) = discriminant Z score of discriminant function j for object k

\( a \) = intercept

\( W_i \) = discriminant coefficient for independent variable i (\( i = 1,2,\ldots,n \))

\( X_{ik} \) = independent variable i for object k

Discriminant analysis was used to identify the variables that distinguish the respondents utilizing PHCs from that of PHs. The classification of the respondents was done on the basis of the usage of healthcare services. The first group consisted of all those respondents who were utilizing healthcare services of PHCs while the
second group consisted of all those respondents who preferred PHs. The usage of healthcare service was hypothesised to be function of the sex (S), age (A), educational status (E), occupation (OCC), households size (HS), and per captia income (PI). The analysis was done at the macro level (i.e.) for all the respondents irrespective of healthcare services.

3.5.4 Garrett’s Rating Scale

To find out the strength of factors ranked by the selected sample groups in relation to the reasons for selecting healthcare services, Garrett’s rating scale technique was used. From the ranks given for each factor, percent positions were calculated by using the formula.

\[ \text{Percent position} = 100 \times (R-0.5)/N \]

where R is the rank assigned and N is the number of items ranked. The percent position was then converted into scores using Garrett’s scores table (Garrett H, 2005). Garret ranking scale technique was used in ranking the various reasons for selection of healthcare services in their order of priority.

3.5.5 Likerts’ Summated Scale

The Likert summated scaling technique was used to scale the reasons, benefits and problems of healthcare service utilization and health insurance. In the Likert scale, the respondent was asked to respond to each of the statements in terms of five degrees of agreement or disagreement.

![Likert Scale Diagram]

Each point on the scale carries a score. Response indicating the least favourable degree of satisfaction is given the least score (say 1) and the most
favourable is given the highest score (say 5). These score values are normally not printed on the instrument but are shown here just to indicate the scoring pattern. The Likert scaling technique, thus, assigns a scale value to each of the five responses. The same procedure is repeated for each and every statement in the instrument. This way the instrument yields a total score for each respondent, which would then measure the respondent’s favourableness toward the given point of view.

3.5.6 Cronbach’s Alpha

Cronbach’s alpha evaluates the unidimensionality of a set of scale items. It’s a measure of the extent to which all the variables in a scale are positively related to each other. In fact, it is really just an adjustment to the average correlation between every variable and every other. The formula for alpha is

$$\alpha_{\text{standardized}} = \frac{K\bar{r}}{1 + (K - 1)\bar{r}}$$

where k is the number of variables and \( \bar{r} \) is the average correlation among all pairs of variables. Cronbach’s alpha values ranges from 0 to 1. The higher the score, the more reliable the generated scale is, Nunnally (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. In the study, the reliability testing was done for the statements pertaining to benefits, problems of PHCs and PHs healthcare services and also for health insurance.

3.5.7 Factor Analysis

Factor analysis is a generic name given to a class of multivariate technique whose primary purpose is to define the underlying structure in a data matrix. Broadly speaking, it addresses the problem of analyzing the structure of the interrelationships (correlations) among a large number of variables by defining a set of common underlying dimensions, known as factors. With factor analysis, the researcher can first identify the separate dimensions of the structure and then determine the extent to which each variable is explained by each dimension. Once these dimensions and the explanation of each variable are determined, the two primary uses for factor analysis, namely summarization and data reduction can be achieved. In
summarizing the data, factor analysis derives underlying dimensions that, when interpreted and understood, describe the data in a much smaller number of concepts than the original individual variables.

Factor analysis was used in the present study to identify the underlying pattern of relationship between the various dimensions of benefits of PHCs and PHs healthcare services, problems of PHCs and PHs healthcare services and identifying the benefits and problems encountered in preferring health insurance among the PHCs and PHs users.

3.5.8 Logistic Regression Analysis

The logistic regression is one that specifies a functional relationship between a basically dichotomous dependent variable and categorical or metric scaled independent variables. In fact it is a method of multivariate analysis of the multiple regression model designed to deal with the situation when one has the measurement of presence or absence, occurrence or non-occurrence of some factors. Logistic regression is concerned with modelling the odds of dependent variable and the parameters for logistic are most easily interpreted as they are expressed as odd ratios. The basic form of logistic function is:

\[
P = \frac{1}{1 + e^{-z}}
\]

when numerator and denominator of the right side of the above equation are multiplied by \(e^z\), the logistic function can be expressed in the following manner:

\[
P = \frac{\exp(z)}{1 + \exp(z)}
\]

where \(z\) is the predictor variable and \(e\) is the base of natural logarithm, equal to 2.71828. Above equation is bivariate. If \(z\) is a linear function of a set of predictor variables then:

\[
Z = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_k X_k
\]
This expression is substituted in the formula for logistic function. Thus, the function becomes

\[ P = \frac{1}{1 + e^{-(b_0 + b_1 x_1 + b_2 x_2 + \ldots + b_k x_k)}} \]

In this analysis, both logistic regression coefficients and odd ratios are used. Odd ratio is the ratio of the probability of the event occurring to the probability of the event not occurring and is denoted as:

\[ \ln \left( \frac{P_i}{1 - P_i} \right) = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_k X_k + e \]

where, \( P_i \) = probability of the event occurring;

\( b_0 \) = constant term;

\( X_1 \) to \( X_k \) = independent variables;

\( b_1 \) to \( b_k \) = unknown regression coefficients associated with the independent variables \( X_1 \) to \( X_k \); and

\( e \) = error term representing unobserved variables that influence dependent variable.

The quantity \( P/1 - P \) is called the odds; hence the quantity \( \ln \left( P_i /1 - P \right) \) is called the log odds or the logit of \( P \).

The coefficients are estimated using the method of maximum likelihood. The logit model was used to identify the probability of possessing health insurance scheme among the sample respondents.

### 3.5.9 Probit Model

The Probit model is a log-linear approach used to measure the effects of the independent variables on the dependent variable. The Probit regression analysis, was used since the OLS estimating procedure will be inappropriate as the dependent variable is dichotomous. Probit regression assumes the categories dependent
reflects an underlying quantitative variable and it uses the accumulative normal distribution. In this model (Probit), the willingness to pay for the health insurance scheme will represent the dependent variable \( Y \). The Probit model was estimated to find out the variables that influence the willingness to pay for health insurance scheme among rural households.

To carry out, the above analysis SPSS 16 Version and AMOS were used. The above techniques are elaborated in Chapter IV, ‘Results and Discussion’.

3.6 Limitations of the study

The present study is based essentially on primary data. It is a known fact that primary data has its own limitations. To have accuracy in the data collected, cross checking was carried out. In this way, though inaccuracy in the given data was minimised, the data could not be considered as 100 percent correct. The present study relies only on the information gathered through surveys, observations and personal interviews, which are subject to bias. As with most empirical studies, the sample size and spectrum of respondents is a limitation. Even though a concerted effort was made to include a range of different individual representing different social groups, the sample was limited to certain geographical area. A statistically random sample would have increased the confidence in the results. Moreover the survey is not representative of the whole Coimbatore. The sample was selected only from the rural area residing near or far way to the Primary healthcare centres. Further, the findings and conclusion could only be applicable to similar set of socio-economic situation.

These limitations in no way negate the findings of the study and offer scope for further research in future.