CHAPTER III

METHODOLOGY AND CONCEPTS USED

3.1 INTRODUCTION

Based on the review of the past literature, this chapter aims to highlight and explain the concepts used for the present study and describe the methodology which includes data sources, selection of the study area, sampling procedure, and tools of analysis.

3.2 METHODOLOGY

3.2.1 Selection of the Study Area

Urban housing problem is a common problem, in developed as well as developing countries. As such, housing problem is prevalent in all Indian cities like elsewhere in the world.

However, it is not possible for an individual researcher to study about urban housing problems in India or Tamil Nadu by collecting primary data due to the limitation of time and energy. So after carefully considering all aspects of the matter and knowing the difficulties and complications in a
study of a bigger area, it was decided to limit the area of study to Madurai City. The reasons that prompted the researcher to choose Madurai as study area are given below.

Madurai is the sixteenth largest city in India and the third largest city in Tamil Nadu. Madurai is a fast growing commercial and manufacturing centre in the State. People from nearby areas are coming down to Madurai with the hope of getting employment in organized and unorganized sectors. A substantial part of the increasing population in Madurai is due to the influx of population from surrounding areas.

The peaceful conditions of life prevailing in this city can be given as another factor for attracting a large number of people from outside the city as migrants. Moreover, population of Madurai consists of diverse linguistic, religious, and cultural groups. According to 2001 census, Madurai city was the 19th populous city among the 36 metropolitan cities of India. Even in the history of Madurai there have been no disturbances at all to its peace either linguistic or communal. Therefore, it is possible to study about the housing problems of those who have settled down in Madurai.
Lastly, the researcher has been quite familiar with the city for many years and hence it is possible to get the necessary support and co-operation from knowledgeable persons and friends in the conduct of the investigations for the study.

3.2.2 Sources of Data

(i) Secondary Data

Decadal surveys by census of India and occasional National Sample Surveys (NSS) provide useful statistics.

The major information like population growth is collected from the Census of India 1961, 1971, 1981, 1991 and 2001. Madurai (study area profile) profile statistics is collected from Corporation of Madurai. Housing activities of the government in Madurai City, various scheme particulars were collected from Tamil Nadu Housing Board office records, Madurai. Slum Clearance Board are also providing assistance to construct houses for the poor people. Hence the housing particulars were collected from Tamil Nadu Slum Clearance Board Madurai. Commercial Banks like Indian Bank and Canara bank are assisting in the construction of houses through various schemes. The housing particulars were collected from the Senior Manager of
the particular bank in Madurai. Tamil Nadu Police Housing Corporation, provides constructed houses to the police personnel on rental basis. The housing particulars were collected from the Executive Engineer Tamil Nadu Police Housing Corporation Madurai. In Madurai, City Co-Operative housing society is also providing housing finance. The particulars were collected from The Chairman, Madurai City Co-Operative Housing society Madurai. The Life Insurance Corporation of India is providing housing loan through Life Insurance Corporation Housing Finance Limited. The relevant details were collected from the Senior Manager LICHFL Madurai.

(ii) Primary Data

The necessary information related to housing like the nature of occupancy, tenure, and facilities available in the house cannot be expected in any of the secondary sources of information. Therefore, it was necessary to collect such primary data directly from the house owners, renters and leased households. Accordingly the primary data of this study was collected by means of intensive field investigation with the help of the pre-tested schedule. A total number of 300 sample respondents were interviewed and the data collected by personal interview method.
(iii) Sampling Procedure

Since the use of census method is highly impractical, it has been decided to collect the primary data by sampling method. Much care has been taken while selecting the samples to see that the samples adequately represent the universe. Accordingly, stratified random sampling method is used to select the sample.

The housing density is calculated based on the number of houses in each ward and geographical area of each ward. The housing density is measured by dividing the total number of houses by the geographical area.

This housing density has been grouped into five density areas such as very low housing density area (5-25 houses), low housing density area (25-75 houses), moderate housing density area (75-100 houses), high housing density area (100-200 houses) and very high housing density area (above 200 houses). The number of wards in each density area has been identified for sample selection. Lottery method has been used for selecting the number of wards in each density area under the plan. Numbers of wards in each density area were written on chits. Five separate containers were arranged for selection of the sample from five density areas. The written
chits were put into the containers and thoroughly mixed. Then three chits were drawn from each container. These sample units were selected at random in each density area. In order to have perfect homogeneity equal numbers of wards were taken from each density area regardless of the size of wards. By this method, three wards had been selected and 20 households were selected from each ward. Thus, 60 households were selected from each density area and altogether 300 sample households were selected from the study area. The sampling design is presented in Table 3.1
TABLE 3.1

SAMPLING DESIGN

<table>
<thead>
<tr>
<th>Density Area (sq km)</th>
<th>Housing Density (Houses/sq. km.)</th>
<th>Ward Numbers</th>
<th>No. of Wards</th>
<th>Wards Selected</th>
<th>Sample units from Each Ward</th>
<th>Total No. of sample units from each Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Very low density (5-25)</td>
<td>4,11,12,13,14,28,30, 52,64,65,66, 67,68,69,72</td>
<td>15</td>
<td>3</td>
<td>52,68, 72</td>
<td>20</td>
</tr>
<tr>
<td>II</td>
<td>Low Density (25-75)</td>
<td>1,2,3,6,7,8,9,21,22, 24,25,27,29,31,32, 34,36,41,42,43,46, 48, 51,55,57,58,59, 70,71</td>
<td>29</td>
<td>3</td>
<td>25,36,43</td>
<td>20</td>
</tr>
<tr>
<td>III</td>
<td>Moderate density (75-100)</td>
<td>5,19,33,37,38,40,49, 50,61,62,63</td>
<td>11</td>
<td>3</td>
<td>5,49,61</td>
<td>20</td>
</tr>
<tr>
<td>IV</td>
<td>High density (100-200)</td>
<td>15,16,17,18,20,23, 26,35,39,44,47,53, 54</td>
<td>13</td>
<td>3</td>
<td>16,47,53</td>
<td>20</td>
</tr>
<tr>
<td>V</td>
<td>Very high density (Above 200)</td>
<td>10,45,56,60</td>
<td>4</td>
<td>3</td>
<td>40,45,56</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>72</td>
<td>15</td>
<td>-</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>

(iv) Collection of Data

With the help of the pre-tested questionnaire, all the 300 sample respondents were personally contacted and the data were collected during May 2006 to October 2006.
Normally the information was collected from the head of the household, but in a few cases, due to the non-availability of the head, the person next in position in the household was interviewed.

3.2.3 Tools of Analysis

The collected data were analysed in a meaningful manner, so as to fulfil the objectives of the study. The primary data collected were edited and coded in order to put the data in a framework, which would permit analysis and comprehension. Data collected for the purpose of the study were first transferred to a master table, which formed a convenient all-time reference, and for all further tabulations.

(i) Percentage Analysis

The conventional tools of analysis like the averages and percentages were used to examine the changes in the income level and the corresponding changes in the expenditure on housing. The details of expenditure are calculated in percentages and presented in the tables.
(ii) Compound Growth Rate

One of the objectives of the study is to analyse the growth pattern of housing. The relative growth rate of housing during a given time period can be analysed meaningfully and objectively by comparing their growth pattern over that period.

The best means available for such an exercise is the compound growth rate \( r \). It is worked out from the least square estimate of the slope coefficient \( b_0 \) in the semi-log equation.

\[
\ln(H_\tau) = a_0 + b_0 t + U
\]

Where \( H \) is the housing at time

(iii) Multiple Regression Analysis

Earlier studies have pointed out the plinth area, household size, age of the house; neighbourhood amenities and household income were the determinants of rent. In order to examine the influence of these variables on the rent, multiple regressions have been used. The model is

\[
Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + u_i
\]

\( Y_i \) - rent of the house
Where

$X_1 =$ Plinth area of the house

$X_2 =$ Household size

$X_3 =$ Age of the house

$X_4 =$ Neighbourhood amenity

$X_5 =$ Household income

The model is estimated by the method of ordinary least square. The estimated value of the co-efficient $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$ and $\beta_5$, gives the influence of the respective explanatory variable on housing.

**(iv) Income Elasticity of Housing**

The relative change in house rent is resulting from relative change in income measured by the income elasticity of housing. It is the ratio between the percentage changes in rent in a given period over the percentage change in income during the same period. With the assumption of constant income elasticity ($u$) over the range of income considered, the income, housing demand relationship is given by log-linear equation.

$$\ln (H_t) = \mu_0 + \mu \ln Y_t + u_t$$

$H_t =$ Housing at the time $t$

$u =$ is the stochastic error term.
(v) Correlation Analysis

Correlation is a statistical technique used for analyzing the behaviour of the two or more variables. The correlation coefficient is calculated between the variables rent and value of the house in relation to household size and PPR Ratio. It measures the degree of relationship between the variables.

In simple terms

\[ r = \frac{\sum xy}{N \times \sigma_x \times \sigma_y} \]

(vi) Trend Analysis

The amount financed and the number of units constructed over the period have been analysed by fitting linear trend lines.

The trend values for total amount of loan sanctioned and number of units constructed by the housing finance institutions have been estimated by using a linear trend equation.
\[ Y_t = a + bt + ut \]

where,

\[ Y_t = \text{Amount of finance/units constructed at time } t \]
\[ t = \text{time variable} \]
\[ 'a' \text{ and 'b' are parameters to be estimated} \]

To analyse the growth patterns of housing in Madurai City, the straight-line trend has been fitted for the year from 1980-81 to 2004-05.

**(vii) \( \chi^2 \) Test**

In order to test the significance of association between tenure status and socio economic and demographic characteristics of the sample households, \( \chi^2 \) test is used

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

where,

\[ O = \text{Observed frequency} \]
\[ E = \text{Expected frequency} \]
If the calculated value of $\chi^2$ statistic is greater than the table value $\chi^2$ for $(r - 1), (c - 1)$ degrees of freedom (where ‘r’ refers to the number of rows and ‘c’ refers to number of columns in the contingency table), then the null hypothesis that there is no significant association between tenure and the respective socio economic trait is rejected and vice versa at 5 percent level of significance.

(viii) Quality of Life Index

Housing is multidimensional in character. Economists and scholars are of the opinion that adoption of multiple indicators both quantitative as well as qualitative, to identify and estimate the extent of the housing condition is more scientific. In this direction, an effort has been made in this study to construct QLI incorporating 10 indicators such as household size, number of children per household, housing condition, water supply, sanitation, education of household head, health condition, occupation of household head, monthly per capita income, under four heads such as Demographic, Physical, social and Economic Characteristics to estimate the magnitude of quality of life among households in Madurai city.
The data relating to 10 indicators are converted into a scale of 0-3. In other words, a four-point scale where the highest quality is assigned the highest score is used to assess the housing in relation to the standard of living. To find out the value of the composite index for each household, scores assigned for all the 10 indicators are added together. Then the households are ranked to the value of composite index. This index depicts the overall condition of well being of each household. A household can score on a particular indicator 0 at the minimum and 3 at the maximum and thus the total score of index varies between 0 and 30.

To find out the index value a linear regression model of the following form is fitted.

\[ Y = a + bx + u \]

where

\[ Y = \text{Per capita income of household} \]

\[ X = \text{Quality of Life Index Value of the household} \]

\[ U = \text{Disturbance term} \]
(ix) Logit Model

The probability of owning a house can be estimated by using the logit model. Consider the house ownership problem.

\[ P_i = E(c_i = 1/Y_i) = a_0 + a_1 y_i \]

where,

\[ Y_i = \text{Income} \]
\[ C_i = 1 \text{ means family owns a house} \]
\[ = 0 \text{ means family does not own a house.} \]

Consider \( P_i \) the probability of owning a house.

\[ P_i = E(c_i = 1/Y_i) = \frac{1}{a_0 + a_1 y_i} = \frac{1}{1 + e^{-z_i}} \]

where

\[ Z_i = a_0 + a_1 y_i \]
\[ ie = \frac{1}{P^i} = 1 + e^{-z_i} \]
\[ \frac{1}{P^i} - 1 = e^{-z_i} \]
\[
\frac{1 - P_i}{P_i} = e^{-zi}
\]

\[
\frac{P_i}{1 - P_i} = e^{-zi}
\]

\[
\log \left( \frac{P_i}{1 - P_i} \right) = Zi
\]

\[
L_i = \log \left( \frac{P_i}{1 - P_i} \right) = Zi = a_0 + a_1 Y_i + u_i
\]

This model is called logit model. The most important characteristic of the logit model is

- As \( P_i \) goes to 0 to 1, the logit \( L_i \) goes to \(-\infty\) to \(+\theta\). Hence, logits are not bounded.
- The probabilities \( P_i \) of owning a house is not linear with income \( Y_i \).
- Given a certain income level say \( Y_i \), we can easily estimate the probability of owning a house. The intercept as gives the probability of a person owning a house is his income is zero. ‘a’, is the slope of the logit model. Whish measures change in \( L_i \) for a unit charge in \( Y_i \).
3.3 CONCEPTS USED IN THE STUDY

(i) Housing Environment

Housing environment is one, which has access to places of work, essential services and amenities that promote good health.

(ii) House

A house is defined as a building or a part of a building, having a separate main entrance from the road or common courtyard or staircase and or recognized as a separate unit.

(iii) Owned House

Owned house means the house is entirely owned by the person with legal registration.

(iv) Rented House

Rented house means tenants, paying an amount called rent to the owners, occupy the house.

(v) Leased House

Leased house is a grant of a right to exclusive possession or occupation of house for a fixed or definite period of time by a payment of
termed rent. The contract for use of the house is called a leased house when made in writing.

(vi) **Pucca House**

Pucca house is one whose walls and roof are made of burnt bricks, cement, concrete, timber, tiles, galvanized iron or asbestos.

(vii) **Kutcha House**

Kutcha House is one whose walls and roof are made of unburnt bricks, bamboo, mud, grass leaves or thatch.

(viii) **Semi-Pucca House**

Semi-Pucca House is one which is constructed with exclusively neither pucca nor kutcha materials. Generally semi-pucca structure comprises walls made of pucca materials with (burnt bricks and cement) and roofs made of kutcha materials (bamboo, and grass leaves). In some cases it may consist of walls of kutcha materials like unburnt bricks, and bamboo, and roofs with pucca materials like timber and backboard.
(ix) Row House

One of a group of houses built in a row, usually alike in design and joined by a common sidewall to its neighbour.

(x) Household Structure

Household structure refers to family composition—whether single member household, nuclear family or joint family. Nuclear family means a husband and wife with their unmarried children.

(xi) Earner

A person who depends for his livelihood on his own employment income or employee compensation or property income or a combination of such incomes is taken as an earner. Persons receiving pensions or contributions are not considered as earners. Family workers actively engaged in helping agricultural and non-agricultural activities of a household are also treated as earners even if they do not have separate income.

(xii) Dependency Ratio

Dependency ratio is defined as the number of workers to number of dependants (non-workers).
(xiii) **Room**

A room should have four walls with a door way with a roof over head and should be wide and long enough for a person to sleep in, that is, it should have a length of not less than 2 meters and a breadth of at least 1 ½ meters and 2 meters in height.

(xiv) **Household**

A household is a group of persons who commonly live together and would take their meals from a common kitchen unless the exigencies of work prevented any of them from doing so.

(xv) **Household Income**

It includes personal earnings of the members of the household, income from investment, business, property and agriculture.

(xvi) **Housing Shortage**

Housing shortage refers to the possibility of many households sharing the house with other households. However, each, household needs privacy and certain amount of amenities. The housing shortage is measured as
number of households minus number of houses. In order to obtain the co-efficient of housing shortage, it is divided by number of houses and multiplied by 100.

In simple terms,

\[
\text{Co-efficient of Housing Shortage} = \frac{\text{Households-Houses}}{\text{Houses}} \times 100
\]

(xvii) Persons Per Room Ratio

Persons per room ratio are the principal measures to the utilisation of housing space. It is clear that in the absence of real measurement the ratio remains an imperfect tool for quantitative analysis. The infinite advance over persons per room ratio is a mere statement of household size. The PPR ratio is adopted to describe the potential privacy of internal arrangements. It is measured by dividing the household size from number of rooms and multiplied to 100.

In simple terms,

\[
\text{PPR Ratio} = \frac{\text{Household Size}}{\text{Number of Rooms}} \times 100
\]
(xviii) **Population Density**

Population density refers to the distribution of population per square kilometer. It is measured by dividing the population by geographical area of the ward and multiplied by 100 (in square km).

In simple terms

\[
P.D. = \frac{\text{Population}}{\text{Geographical Area in sq.kilometer}} \times 100
\]

(xix) **Housing Density**

Housing density refers the distribution of houses per square kilometer. It is measured by dividing the number of houses by the geographical area of the ward and multiplied by 100.

In simple terms,

\[
\text{Housing Density} = \frac{\text{Houses}}{\text{Area of the ward in sq.kilometer}} \times 100
\]