CHAPTER III

METHODOLOGY

This chapter presents the procedure adopted for conducting the present investigation. It has been discussed under the following heads :

1. Conceptual Framework of the Study
2. Operational Definitions
3. Variables
4. Development of the Instrument
5. Selection of the Sample
6. Method of Data Collection
7. Analysis of Data

The main purpose of the study was to ascertain the degree of stress felt by homemakers due to energy crisis and the strategies adopted by them to cope with the energy crisis situation. Descriptive type of survey design was used for the study. Structured interview method was used for the purpose of obtaining complete and authentic data as some homemakers were illiterate.

1. Conceptual Framework of the Study

From the ecological perspective, family is an energy-driven open system. It is dependent on the environment for its energy requirements. Scarcity of energy and its price rise directly and indirectly affects families at the micro

level. The theoretical framework conceptualised depicts the line of action followed by families during the energy crisis situation to reach desired ends and achieve satisfaction to some extent in energy use. The action taken reflects the family managerial behaviour in energy crisis situation (Figure 1).

Conceptual Framework to study the Family Managerial Behaviour under Energy Crisis Situation

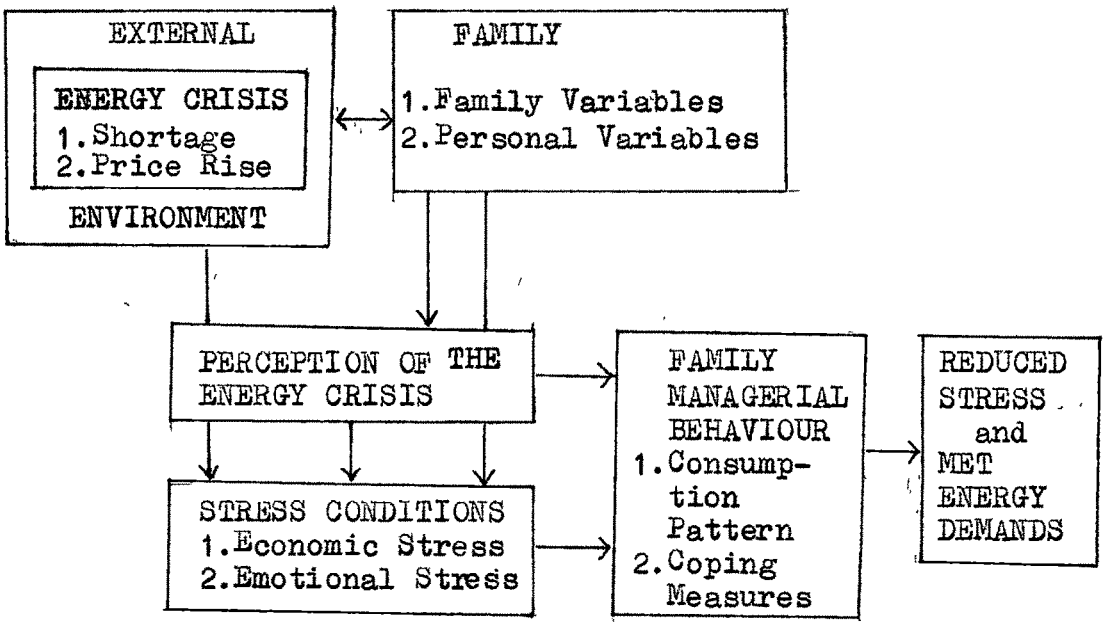


Fig. 1

A family acts in a particular set pattern depending on the perception of the family's total environment - external and internal and resources available for meeting the needs of the family. This constitutes the family's consumption pattern or the family's lifestyle in relation

to energy use. In the changed situation i.e. energy crisis in the external environment, the family is forced to change/ modify its consumption behaviour pattern to maintain stability in the family ecosystem. It calls for deliberate decision-making as the usual behaviour pattern is no longer adequate in such a situation. Considering various factors such as socio-economic status, family values, income and size, and the stress felt due to energy crisis situation, families will adopt various coping measures to reduce stress conditions and meet the energy demands of the family. Perception of the energy crisis situation will help in following a energy conservation oriented behaviour pattern which may also depend on the degree of stress felt. Perception of the energy crisis may be assumed to influence the degree of stress felt during crisis situation.

The two way arrow between the external environment and the family represents the interdependence of the two systems. The decisions families make in terms of energy consumption and adoption of coping measures also affect the energy crisis situation in the environment to a great extent.

2. Operational Definitions

Certain terms were operationally defined for measurement of variables of this research which are described below :

Crisis is defined as a change in the environment of such magnitude that the usual behaviour pattern becomes inadequate which must be modified to meet the situation.

Energy refers to all forms of non-human power, both commercial and non-commercial, utilized by families in their day-to-day living.

Energy Crisis : It is the situation when families experience household energy shortage and price hike of such magnitude that it calls for decision-making and modification in the usual managerial behaviour related to energy consumption and conservation.

Commercial Energy Sources : Commercial energy sources consist of those energy forms which are transformed from the primary sources into energy for consumption and enter the monetized economy. These include coke, coal, electricity, liquid petroleum gas (LPG), kerosene and petrol.

Non-Commercial Energy Sources : Non-commercial energy consists of those energy sources which can be used directly as fuels without any conversion and usually do not enter monetized economy. These include cowdung, firewood and agricultural wastes.

Energy Consumption Pattern : It is the family's present way of energy consumption in terms of quantity of energy forms

used and the expenditure incurred on it per month.

Stress due to Energy Crisis : It refers to the economic and emotional strain felt by families due to energy crisis. Economic strain is felt when price of energy forms increases and the families face problem in meeting their other household expenses.

Emotional strain is caused when families are under tension due to energy shortage and its price increase, which directly influence the energy based household work, comfort in living and meeting family demands.

Perception of Energy Crisis : It is the understanding and knowledge that homemakers possess regarding the energy situation, its causes and effects due to shortage in the past, present and future.

Family Managerial Behaviour : The family managerial behaviour is reflected in the managerial decisions taken or the ability exhibited by the family to act in a changed situation - the energy crisis. The decision implementation is done by adopting various coping measures.

Coping Measures : Coping measures are the decisions/ alternatives and actions taken by families for meeting the energy crisis situation in order to reduce the stress caused by it.

Such actions will deal with :

(i) Substitution Measures : They are the alternatives which help to replace the scarce energy temporarily with another available energy source. For example, use of firewood during kerosene shortage; transistor during power-cut; and use of bicycle instead of scooter or car during petrol crisis.

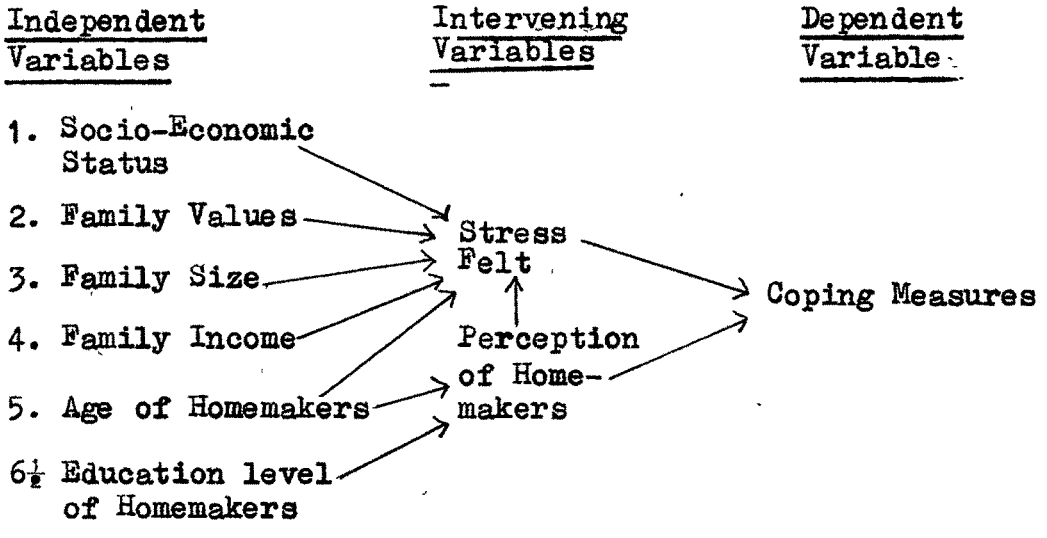
(ii) Supplementary Measures refer to those additional means which are adopted alongwith the use of scarce energy. For example, making use of electric heaters for specific purposes or use of solar cookers and solar water heaters.

(iii) Adjustment Measures : are those alternatives which bring about a change in the usual behaviour pattern and lifestyle to cope with the energy crisis situation. For example, using more of public transport than own vehicle; wearing unironed clothes during power shortage.

(iv) Conservation Measures : They are the different methods and work simplification techniques which help to reduce energy consumption. For example, cooking food in large quantities at a time and storing in the refrigerator; making large quantity purchases at a time to save on petrol; using more of tubelights than bulbs; and making maximum use of pressure cooker for saving fuel.

3. Variables

The variables selected for the present research alongwith their relationship is shown schematically :



In the following discussion the dependent variable and the rationale for selecting the independent and intervening variables are highlighted.

3a. Dependent Variable

Coping measures was the dependent variable of the study. As defined earlier, they are the decisions/alternatives and actions taken by families for meeting the energy crisis situation in order to reduce the stress caused by it. In energy crisis situations the family's management patterns are bound to change. What is the direction of change must be known ? The literature reviewed showed dearth of information on this aspect. Hence, it was considered

essential to investigate the coping measures adopted during energy crisis situations.

3b. Intervening Variables

The intervening variables were perception of homemakers and stress felt due to energy crisis. The intervening variables act as dependent variables being directly affected by personal and family variables and they also operate as independent variables in their relationship to coping measures adopted.

3b(i) Perception of homemakers : There will be variation among individuals on level of perception as it is dependent on the environmental conditions, age and educational level (Kaul, 1984). It affects the degree of stress felt due to energy crisis and the coping measures adopted.

3b(ii) Stress felt : It is an intervening variable because it is felt due to changes in the availability and price rise of energy sources in the external environment. These fluctuations cause economic and emotional strains on the family which necessitates a change in the usual management pattern for meeting family energy demands. The degree of stress felt varies with each individual. As stress and perception were important concepts in studying the family

managerial behaviour during crisis situations, they were incorporated in the present investigation.

3c. Independent Variables

The independent variables were classified into two types : (i) Family variables which consisted of socio-economic status, family values, family size and family income. (ii) Personal variables which included age and educational level of homemakers.

3c(i) Family Variables :

Socio-economic status : The socio-economic status of the family is determined by the family's total income, educational level and occupation of the head of the family. It was found from review of literature that socio-economic status is one of the important factors which influences family managerial behaviour (Baker, 1979; Bailey, 1980; Uusitalo, 1983). Thus, it was included as an important variable in the present investigation.

Family values : Values give direction to one's life and one's behaviour. They influence the coping behaviour of families in energy crisis. Few family level studies have been conducted to study eco-consciousness as a family value (Hogan, 1976; Hungerford, 1978; George, 1983), but other

family values related to energy have not been investigated. Hence, family values being an important variable was studied in the present research project.

Family size : Family size was found to be associated with energy consumption (Morrison and Gladhart, 1976; McNew, 1979). As no data were available on family size in relation to stress felt due to energy crisis and the managerial behaviour, this variable was included for the study.

Family income : Family income per month is defined as the net disposable income from various sources. Few researches revealed that as family income increased, there was an increase in the amount of the various sources of energy utilised (Gladhart, 1975; Morrison et al., 1978; Newman and Day, 1974; Yao, 1980). Family income was also found to influence energy conservation behaviours (George, 1983). The relationships between family income, stress felt and coping measures adopted was not explored. Hence, family income was considered to be an important variable for this study.

3c(ii) Personal Variables :

Age of homemakers : Age was found to be a factor influencing energy consumption and conservation.(McCutcheon,

1981; Ayotollahi, 1980; Merkley, 1981; George, 1983; Kaul, 1984). Data on the relationship of age of homemakers with perception, stress felt and coping measures adopted was lacking. Thus, it was thought appropriate to study this variable.

Educational level of homemakers : Education is an important variable as it influences perception of energy crisis and indirectly the managerial behaviour. A few studies have shown that education level influences the energy consumption and conservation behaviour. (Morrison et al., 1978; Ayotollahi, 1980; Uusitalo, 1983; Kaul,1984). Therefore, education was included in the study to determine the relationship between education and perception of homemakers regarding energy crisis and its influence on the coping measures adopted.

On the basis of the above observations, it was thought appropriate to include all the above mentioned variables in the present investigation.

4. Development of the Instrument

The interview schedule was constructed keeping in view the objectives of the study. It comprised of five sections. Section I of the interview schedule contained questions to elicit information about the background characteristics of

the sample. Section II dealt with the details regarding the energy consumption pattern of families. It included the different energy forms used by families, quantity consumed and monthly expenditure incurred on them, types of electrical equipment and vehicles possessed, problems faced in procuring the different energy forms and awareness about the alternative technologies such as biogas and solar cookers. Section III consisted of the perception scale to measure the level of homemakers' perception about the energy crisis situation of the country. Section IV comprised the stress scale which helped to determine the stress felt by homemakers due to energy shortage and price rise. The last section dealt with the coping measures which helped to determine the family managerial behaviour in the energy crisis situation. The instrument prepared initially was distributed to a panel of judges for establishing its content validity. The judges were experts from the Faculty of Home Science, Department of Education, and Department of Psychology of M.S. University, Baroda; Department of Home Management of Punjab Agricultural University, Ludhiana; and Director of GEDA, Baroda. The interview schedule was translated into Hindi as the respondents did not know English. Help for Hindi editing was sought from Department of Hindi, M.S. University of Baroda.

4a. Development of the Scale to measure Perception of Energy Crisis

The objective of assessing the level of perception of homemakers regarding the energy crisis situation required a standardised scale to measure it. Statements related to the crisis situation were formulated, and the content validity and reliability were determined as follows :

Statements on crisis situation framed were concerning the energy situation in the country, its causes, effects, alternatives and possible solutions.

Item Collection : Items relevant to study the perception of energy crisis were developed after an extensive review of literature. The most important factor considered in collecting and framing the items was that it should be within the level of homemakers' understanding. These were then thoroughly screened and edited so as to make them simple, clear and meaningful. In all 45 statements were retained representing different aspects of energy crisis.

Content Validity of the Perception Scale :

The validity of a scale concerns what the scale measures and how well it does so. The content validity assesses the relevance of the scale to the stated purpose.

The items formulated were then distributed to a panel of ten judges. The judges were requested to indicate the clarity of each statement and relevance of each item to the perception being measured. The screening of items was done on the basis of the following criteria :

(i) Items with consensus of seventy percent or more judges on clarity of the statement and relevance to the problem being studied were retained in the scale.

(ii) Those items which were reported as relevant but not clear by seventy percent or more judges were reworded to make them clear and included in the scale.

Besides the above, suggestions given by some judges were also incorporated, like avoiding repetition and double-barrelled items. The statements were modified accordingly. As per the judgement of panel of experts on the perception scale, eight statements were eliminated (Appendix I). Out of the original forty-five statements thirty-seven statements which fulfilled the above criteria were included in the perception scale for the pilot study. (Appendix II).

4b. Development of the Scale to measure Stress Felt due to Energy Crisis

A five point continuum rating scale was developed to measure the degree of stress felt due to energy crisis. Stress

as a basis for the selection of statements :

1. Items on which there was agreement of seventy percent or more judges on clarity and relevance of the statement were selected.
2. Those items on which sixty percent or more judges showed agreement as regards the category where they fitted the best were included in the stress scale under that particular category.

There were certain items which were not falling exclusively in one category. Moreover, two categories were thought to be overlapping. The category, personal dissatisfaction was clubbed with household work stress as household work is mainly done by the homemakers, and change in family lifestyle was combined with discomfort and inconvenience category. Finally four categories of stress were made : (1) Economic stress, (2) Household work stress, (3) Stress due to obstructions in comfortable living, (4) Stress due to inability in meeting family demands.

On the basis of the above criteria, four items were rejected (Appendix III), thus leaving thirty-two items for inclusion in the stress scale to be used for the pilot study. (Appendix IV).

4c. Development of the Coping Behaviour Instrument

A structured interview schedule was prepared to study the coping measures adopted by families in different energy crisis situations. The situations studied were shortage and price rise of cooking fuels, petrol and electricity.

The crisis situations were described along with the possible coping measures. The situations were the practical problems experienced by families in their day-to-day living due to energy crisis. The list of possible alternatives for each energy resource and situation was made on basis of the literature reviewed. This was also given to a panel of five judges for scrutiny. The judges were requested to classify each coping measure under any one of the following six categories.

1. Substitution measures
2. Measures causing change in family lifestyle.
3. Supplementary measures
4. Conservation measures
5. Measures related to care and maintenance of equipment.
6. Measures causing change in work schedule.

For clarity, the operational definition of all categories was also furnished to the judges. Consensus of four or more judges was considered for classification of the coping measures in the different categories mentioned

above. On basis of the suggestion of judges, these categories were combined to form only three categories i.e. (1) Substitution/Supplementary measures; (2) Adjustment measures; and (3) Conservation measures so as to facilitate analysis. Categories 1 and 3 were combined to form the first category; 2 and 6 to form second category; and 4 and 5 formed the third category. The final instrument thus prepared was used for the pilot study (Appendix V).

4d. Pilot Study

A pilot study was conducted to establish the validity and reliability of the instruments on a sample of 50 families from Jagadhri town in District Ambala, Haryana. Data were subjected to statistical test for establishing the reliability of the instruments for constructing the final instrument. The reliability of the Hindi version of the scale was estimated. Minor changes were made in the interview schedule on basis of the pilot study which was then utilized for the final collection of data.

4e. Reliability of the Instruments

Reliability refers to the accuracy (consistency and stability) of measurement by a test (Anastasi, 1982). In technical terms, reliability has been defined as the ratio of the true score variance to the variance in the scores

as observed (Helmstadter, 1964). This is an index of the amount of variable error in a test. The reliability varies on a scale from zero to one, having the former value when the measurement involves nothing but error and reaching the latter value only when there is no variable error at all in the measurement.

To ascertain the reliability of the instruments, the following procedure was adopted.

Scoring of Responses on the Perception and Stress Scales : The responses of homemakers on each item on both perception and stress scales were quantified by ascribing scores. For the perception of energy crisis scale, scores of one to five were assigned to categories 'Strongly disagree', 'Disagree', 'Undecided', 'Agree', and 'Strongly agree', respectively, which indicated the extent of perception of the energy crisis situation. A weightage of one to four was given to responses 'Not at all', 'Somewhat', 'Quite a bit', and 'Very much so', respectively, on the stress scale which determined the degree and kinds of stress felt due to energy crisis.

Item Analysis for Perception Scale : Perception scale was also analysed quantitatively by doing item analysis to increase its validity and reliability. Item analysis was

done to eliminate inconsistency of the items. Item discrimination was determined. The responses of respondents were scored by alloting weightage to the items as described earlier. The weighted score for each item and also for each respondent was totalled up. The total scores of fifty respondents were arranged in order and then the upper 33 percent (17) and lower 33 percent (17) were taken as the criterion groups to evaluate the individual statements. Then each item was analysed to determine how effectively it differentiates between the high and low groups. The 't' value for each item was computed to find the discriminating power of each item, i.e. distinguishing between good and poor perceivers of energy crisis. Only those items which showed a significant difference between high and low scorers were retained for the final scale (Appendix VI). Besides 't' test, correlation values between the item scores and total scores of each respondent were computed by using the Pearson Product-Moment Correlation formula for determining the internal consistency of items. Items with significant correlation values were selected for inclusion in the final scale. Out of thirty-seven items, twenty-two items were retained in the perception scale after item analysis (Appendix VII).

Reliability Coefficient of Perception Scale : Split-half technique was applied to determine the reliability coefficient of the test. The whole scale was divided into two halves by employing the odd-even method. The total scores of each respondent in the odd and even categories were found out. Each of the two sets of items was treated as separate scales. The respondents who scored high on odd items should score high on even items as well, if empirical errors have been kept to a minimum and the same applies in the case of low scorers as well. The coefficient of correlation between odd and even scores of fifty respondents was computed by the Pearson Product-Moment Correlation Coefficient formula. Then the reliability coefficient of the whole test was estimated by using the Spearman-Brown Formula which is :

$$r_{tt} = \frac{2r_{hh}}{1 + r_{hh}}$$

where r_{tt} is the reliability coefficient of the whole test and r_{hh} is the correlation coefficient of the half test obtained by the Pearson Product-Moment formula. The reliability coefficient of the perception scale computed was 0.87 (of the Hindi version of the scale).

Reliability Coefficient of the Stress Scale : Similar procedure as above, i.e. split-half technique, was employed for estimating the reliability of the stress scale. The reliability coefficient computed was 0.86.

Both the perception and stress scales gave high reliability values indicating that the scales were reliable for measuring perception of homemakers and the stress felt due to energy crisis.

4f. Results of the Pilot Study

The pilot study was planned with the purpose of testing the validity, reliability, and feasibility of the instrument. As an outcome of the pilot study certain modifications were made in the tools to be used for the final study.

1. The homemakers were unable to give their correct family income, therefore, income range was given.
2. Questions were combined to make the interview schedule short as it was too long and time-consuming as reported by respondents.
3. The first and second sections were found to be suitable for collecting relevant data and only minor changes were made.
4. The perception scale was found to be reliable. The reliability coefficient computed was 0.87 after eliminating the items by item analysis, which indicates a high degree of reliability of the scale.

The response categories were changed slightly. Instead of the five categories mentioned earlier, four categories of 'strongly agree', 'agree', 'disagree' and 'don't know' were made and scores of 3, 2, 1 and 0, respectively, were assigned to them.

5. The stress scale was re-organised so that statements related to a particular type of stress were grouped together. Moreover, certain statements which were not applicable to large number of respondents were eliminated and the scale was shortened. The final scale consisted of only twenty-five statements. A category of 'not applicable' was added to the four categories and a weightage of 'zero' was ascribed to it. The reliability coefficient calculated was 0.86 which indicates a high degree of reliability of the scale. It was found to be suitable for determining the degree and kinds of stress felt.

6. The categories in the coping measures instruments were reduced from five to three in all three crisis situations. The final categories were substitution/supplementary measures, adjustment measures, and conservation measures. Some alternatives which were not used by majority in crisis situations were eliminated. Moreover, the three response categories of 'always', 'sometimes', 'never' were converted into 'yes' and 'no' as respondents have a tendency to give most of their responses in the middle category of 'sometimes'.

7. The questionnaire method was not found to be suitable for data collection as respondents were not able to provide reliable and correct data. Therefore, interview method was adopted for final data collection with the help of an interview schedule.

The final instrument used for data collection was in Hindi only (Appendix VIIIA and VIIIB).

5. Selection of the Sample

5a. Population

The survey was conducted in Jagadhri town of Ambala District, Haryana. It is an industrial town with a large number (1250) of metal industries (Brass and Steel). The total land area is 10.87 sq. kilometres having a total population of 43,102 (1981 Census). It is surrounded by agricultural land constituting about 95 percent. The Jagadhri town is divided into five circles with a total number of 10,295 households and each circle had a population consisting of all three SES groups. Two circles, number one and four consisting of 912 and 2862 households respectively, were purposively chosen for data collection because of convenience as they were easily accessible. Circle I had twelve colonies and Circle IV had seventeen colonies.

5b. Sample Size

A random selection of 260 households out of 3774, representing three different socio-economic classes, was made from the two circles chosen for the study. An attempt was made to select nine to ten households from each colony, taking every third or fifth house for randomization of the sample. The Kuppuswamy's socio-economic status scale (1981) was used for classifying the sample into three socio-economic groups. The sample constituted fifty families from low socio-economic group (19.23 percent), 120 families from middle group (46.15 percent) and ninety families belonged to the high socio-economic group (34.62 percent).

6. Method of Data Collection

Data were gathered personally by using the structured interview method. The data were collected with help of the pretested instrument reported earlier. Homemakers were the principle respondents for the investigation and family member who used the vehicle possessed by them was also interviewed to gather information regarding use of petrol and driving habits. Period of data collection was from January 1985 to March 1985.

7. Analysis of Data

7a. Categorisation of the Sample for the Purpose of Analysis

For the purpose of analysis, variables of the study were categorized as given below :

1.	Family size	1. Small	- Two to four members
		2. Medium	- Five to eight members
		3. Large	- Nine or more members
2.	Monthly family income	1. Low	- Rs.749 and below
		2. Middle	- Rs.750 to Rs.1999
		3. High	- Rs.2000 and above
3.	Age of home-makers		- 30 years and below
			- 31 years to 40 years
			- 41 years to 50 years
			- 51 years and above
4.	Education level of homemakers		- Illiterate
			- School education
			- College education
5.	Size of the house		- One to two rooms
			- Three to four rooms
			- Five to six rooms
			- Seven or more rooms
6.	Level of perception of homemakers	1. Poor	- Scores below $\bar{X}$ - SD
		2. Average	- Scores from $\bar{X}$ - SD to $\bar{X}$ + SD
		3. Good	- Scores above $\bar{X}$ + SD
7.	Degree of Stress felt	1. Low	- Scores below $\bar{X}$ - SD
		2. Moderate	- Scores from $\bar{X}$ - SD to $\bar{X}$ + SD
		3. High	- Scores above $\bar{X}$ + SD

$$S_{D\bar{X}} = \sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{N_1 + N_2 - 2} \left(\frac{1}{N_1} + \frac{1}{N_2} \right)}$$

The minimum level of significance required for judging the relationships under investigation was 0.05 level of probability.
