METHODOLOGY

CHAPTER III

METHODOLOGY

The concern of this Chapter is to present the methodology/strategy designed in order to find answers to the research questions posed for the study. For the sake of clarity, the sequence of discussion has been dealt within five sub-sections given below :

3.1 Theoretical Consideration and Conceptual Framework

3.2 Research and Sampling Design

3.3 Field Survey

3.4 Data Analysis

3.5 Operational Definitions of the Concepts

SECTION I

3.1 Theoretical Consideration And Conceptual Framework

Throughout human history, technological diffusion has been a regular and important phenomenon yielding theories directly applicable to the current pressing problems of development. Technology has been viewed differently by different authors. Some have viewed it as an environmental element which adds on to the social structure of the society and is an object to which the latter reacts (Ogburn, 1955) whereas others view it as a part of cultural and not physical environment and thus social in nature (Merton, 1957). Freeman (1974) stated that wherever found, technology is intermeshed with social behaviour of human beings, as it specifies roles

that take their character from requirements of technical operations. There is always involved a complex set of transfer of welfare from some social groups to others and from one time to another in the sense that contemporary decisions may impose costs or create benefits for future generations.

As has already been discussed earlier, introduction of various kinds of technology could have positive effect on the status of rural women so far as it increases their knowledge, awareness and participation in outside world, while on the other hand it can also have negative impact on their position by depriving rural women from jobs which they have been traditionally doing and thus making them victims of technology (Vardappan, 1975; Boserup, 1977; Lindsey, 1980; Draft of Sixth Plan, 1981 and Shram Shakti, 1987).

The dimension of rural women and technology remains an under researched area where a composite picture still has to emerge. Many queries, mainly the one's raised in the earlier section of the present study (vide page no.9-10) remain unanswered. Moreover, definite guidelines are required to assess the impact of technology on the status of rural women simultaneously in terms of costs and benefits. Hence, an attempt has been made here to conceptualize this dimension (Fig. 3.1) by taking the Ecosystem Perspective of the Household given by Paolucci (1976) and the Resource Management Framework based on the theoretical

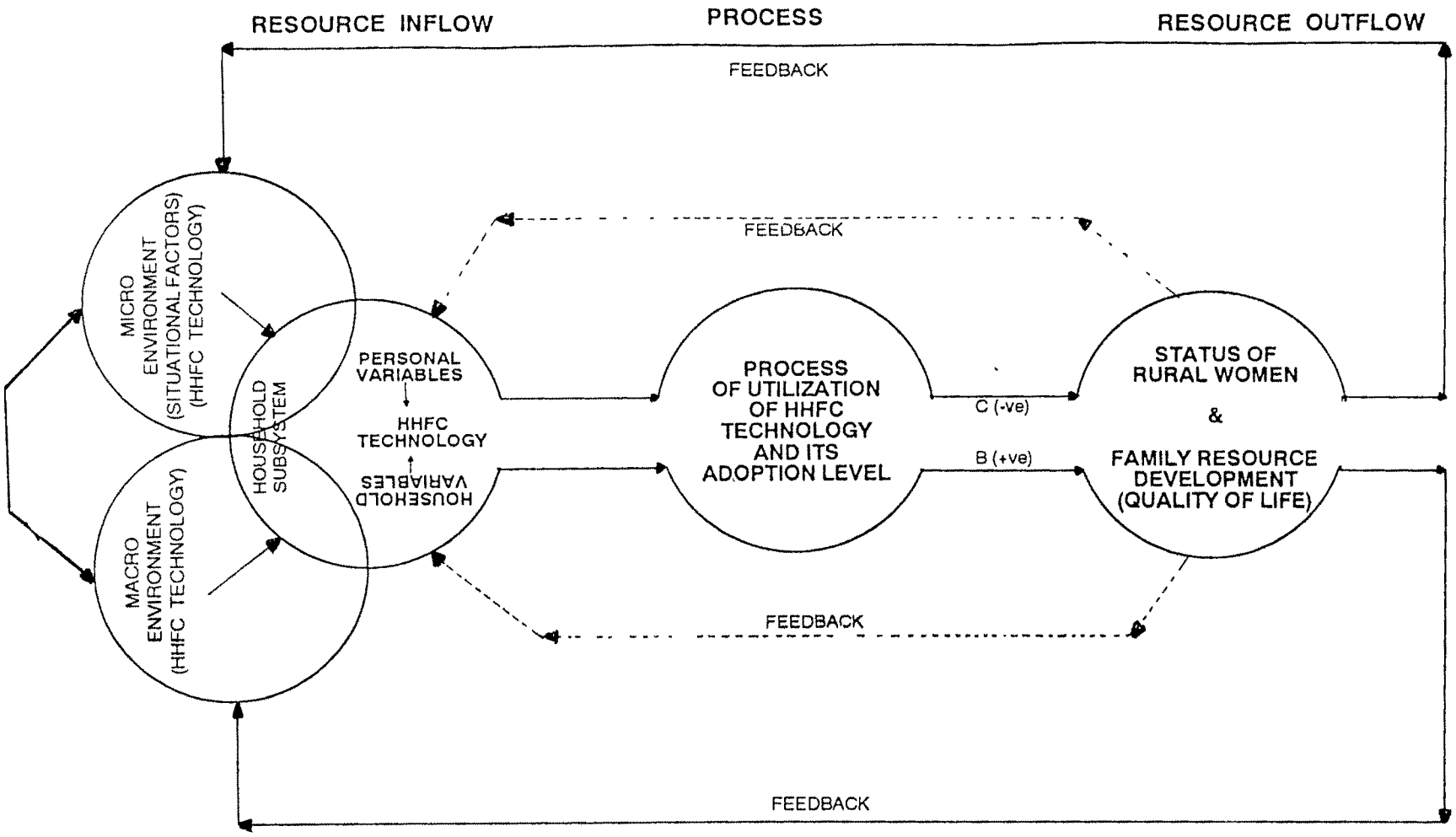

Fig 3.1. CONCEPTUAL FRAMEWORK FOR THE STUDY

conceptualization of Deacon and Firebaugh (1988) as the broad base.

The Ecosystem Model consists of three elements-macro environment (national level), micro environment (the State or the near environment) and the household sub-system which was considered as the core in this household level research. The household sub-system comprises the personal and family characteristics but the resources of the sub-system are also affected by its macro and micro environment. For instance, the economic characteristic of the higher income group may help the household sub-system to adopt farm technology that may further augment their economic resource. Similarly, rural women's exposure to outer system may result in utilization of health services and thus in better health seeking behaviour. Availability and accessibility of different types of technology (household technology, agricultural technology, health technology and communication technology) from the outer system goes into the household sub-system in terms of resource inflow depending upon household's ability to command these resources. There could be a constant interaction depending on outer systems, that are in turn, mostly governed by resources found in the household sub-system as described in the conceptual framework.

For the current study focussing on women and technology, three major components within the household sub-system were considered that are indicated in the model (Fig. 3.1) as :

Personal Variables	:	Variables associated with the homemaker such as age, education level and work status operationalised in four categories : housewife, unpaid family worker, paid worker and self-employed (see Operational Definitions)
Household Variables	:	Age of the spouse, education level of the spouse, occupation of the spouse, family's income and per capita income, caste, type of family, size and composition of family, size of the operated land, ownership of the livestock and housing and kitchen conditions / facilities.
Situational/ Environmental Variables	:	Technology (Household, Health, Farm and Communication) - Availability / Access, within and between the regions.

3.1.1 PERSONAL VARIABLES

3.1.1.1. Age of the Homemaker : Age is a personal factor, and in rural social system in India, it commands respect and authority. This is more important in case of women, whose status is determined by the number of years she has spent in

her in-laws home. Kaur (1986) stated that work participation of homemakers decreased with increase in age.

Moreover, acquisition of skills, formation of interest, attitudes and needs also vary with age. Thus, the investigator was keen to find out the strength of the variable.

3.1.1.2. Education level of the Homemaker : Education is one of the important variables which indicates the condition of women in any society and attitude of soiety towards its women.

Literacy level also reflects the cognitive component of the women and can affect qualitatively the time spent on various tasks and also her awareness regarding various infrastructural facilities and access to technology that may again determine her status.

3.1.1.3 Work Status of the Homemaker : Work status was considered as an important variable for the present study because if women are effective income earners, it could reduce their dependency and enhance their status. It may reduce fertility as examples of inverse relationship between female labor force participation and fertility rates are numerous. (Sultana, 1984; Kaur, 1988 and Sunder, 1990).

It can also lead to increased share of family income allocated to nutritional food and health care, thus improving their level of living (Palmer 1977). Hence, such a variable

which is strong enough to exert diverse effects, was incorporated in the present study.

3.1.2 HOUSEHOLD VARIABLES

3.1.2.1 Age of the Spouse : A few studies have reported that age of spouse influences the adoption level of technology that in turn plays a crucial role in determining the status of the homemaker.

Lack of enough literature linking age of the spouse to women's status with/without technology necessitated this variable to be studied in the present context.

3.1.2.2 Education level of the Spouse : Education is one of the important factors which accelerates growth and development in farming. Education level of the spouse is important for acquisition, comprehension, acceptance of information and ownership of technology (Varma, 1992). So it was included as a variable in the present study. It also affects the attitude of the males towards status of females to some extent.

3.1.2.3 Family Income and Per Capita Income : Many researches have established a significant association of family income with status of women and level of living of the family. Farouq (1980) indicated that hours of productive work increased when a person's family capital becomes smaller, thus, enhancing their economic participation. Sinha (1975)

and Kuntal (1979) reported an inverse relationship between income and female labour participation rates. Jain (1986) pointed that an association existed between women's participation in agricultural work and family's income. The investigator was keen to find out the strength of this variable with the status of women and family resource development.

3.1.2.4 Caste : Caste is considered as an important institution of rural Indian society. It is generaly believed that women's access to various infrastructural facilities like machinery, extension personnel etc. and also their participation in various paid and unpaid activities that ultimately determine her status in the family is governed by the caste (Kaur, 1988 and Varma 1992). Inconsistent results have been reported by various researchers. According to Desai (1978) "Caste differences determined the differences in modes of domestic and social life, type of houses and cultural patterns of the rural people". This in turn may effect their productivity status.

In order to throw more light on the association between caste and status of women, caste was taken up as one of the independent variables.

3.1.2.5 Size of the Family : Size of the family, as a variable has been linked with time use of homemakers through a number of studies (Grewal, 1980; Chauhan, 1981 and Sandhu, 1985). Almost all the studies have unanimously established a

positive association of family size with time use pattern i.e. an increase in time use on household work with an increase in family size. But none of the studies have explored the linkage of family size, use of technology and its effect on time spent on household, farm or paid work. Thus, family size was taken as an independent variable for the study.

3.1.2.6 Presence of Female Relatives in the Household : Kamalamma, 1981; Agarwal, 1988 and Singal, 1989 reported that presence of female relatives like daughter or daughter-in-law or mother-in-law in the family will result in the division of household work. But no association has been reported by any of the researcher except Singal, 1989 between presence of female member and women's time use pattern. This can also result in homemaker's gainful employment outside the home, that might enhance her economic status. It could be that access and availability cost of household technology can outweigh the benefits of presence of female members. Therefore, it was felt necessary to include this variable for the present investigation.

3.1.2.7 Type of Family : Various researches have reported a significant relationship between type of family and women's participation in decision making. Sharma and Singh, 1970; Puri, 1971, Mulay et al, 1974 and Awasthy, 1982 reported that in nuclear families the involvement of women in all family decisions was more especially in the field of agriculture.

Hence, type of family was taken as an independent variable for the current study.

3.1.2.8 Size of the Operated Land : Rural women have been time honoured partners with men in agriculture. Deere, 1982; Verma and Malik, 1984; Jain, 1986 and Agarwal, 1988 observed marked variations in the tasks in which women participated and their access to technology according to the land holding size. Pandey et al, 1986; Kaur, 1988 and Varma, 1992 also reported that level of living varied with size of the landholding. Thus, keeping the above association in mind, it was considered as a factor affecting women's status and family resource development.

3.1.2.9 Ownership of Livestock : Recognising livestock as a major component of rural women's work in Haryana, it was assumed that it might be having an effective association with consumption expenditure pattern of the rural households. Moreover, it can also affect time use pattern of rural women as various researches (Jain, 1980; Dey, 1981; Gupta, 1986 and Singal, 1989) have shown that rural women are mainly responsible for livestock work. Farm and household technology may also have differential effect on time spent by homemakers in livestock activities.

3.1.2.10 Housing and Kitchen Condition/Facilities : The physical as well as mental health of a person is determined by his/her surroundings. Housing and kitchen condition / facilities can also significantly affect the human cost of

work as work place exerts an influence on the time use pattern of homemakers. But this linkage lacks empirical support. Hence, to fill in that gap, it was taken as an independent variable in the present study.

3.1.3 SITUATIONAL VARIABLES

3.1.3.1 Household Technology : This was taken as an independent variable because it has a direct bearing on the productivity status of the women. Many studies have reported that with usage of time and labour saving devices, the workload of women decrease and leisure increases and there is reduction in drudgery of work (Sihag, 1985; Sharma, 1986 and Kaur, 1988). Hence, it was of interest to find out the strength of this variable on productivity status as well as quality of life of the rural women.

3.1.3.2 Agricultural Technology : There is a correlation that has considerable empirical support i.e. as the use of agricultural technology increases, status of women decreases as they are either thrown out or are displaced from their traditional employment (Lowie, 1974; Hawkes and Wolley, 1963; Boserup, 1977; Palmer, 1977 and Deckard, 1979). This led to its inclusion in the present study as an independent variable.

3.1.3.3 Health Technology : Technologies related to birth and birth control have a great liberating influence for women that have direct effect on their health status. Very few studies (Kaur, 1986 and Shram Shakti, 1987) have dealt with

the relationship that exists between health technology and status of women in terms of costs and benefits. Hence, to fill in the gap and to determine the linkage between status of women and availability of health technology, it was included as an independent variable.

3.1.3.4 Communication Technology : Communication technology directly affects the knowledge and attitude of women towards certain important issues concerning them. All means of communication and information can go a long way towards helping to remove the attitudinal and cultural factors that still inhibit women's development (Declaration of Mexico Conference, 1975). Hence, it was of interest to find out the strength of this independent variable on status of rural women and their family resource development.

The total sum of resources, accessible and available both from within and outside sub-system will enter the throughput component. In the process of usage of resource inflow, there can be positive as well as negative results. For example, usage of household technology items can reduce drudgery of household work for the homemaker but the same technology, if it is of poor quality or requires more maintenance or is costly in terms of electricity consumption, can have negative impact, so much so that the cost may outweigh the benefit of technology. Farm technology, if it can utilize women's productive power more efficiently can be beneficial otherwise, if it displaces, marginalizes or pauperizes women then cost of farm technology would be more

than the benefit as far as rural women are concerned. In the present research study, benefits and costs of selected technology have been measured in the following way :

Type of Technology	Measurement of Benefits of Technology	Measurement of Costs of Technology
1	2	3
Household Technology	Use of household technology-increase in workload, increase in leisure time and decrease in drudgery of work.	Care and maintenance of household technology consumes more time and energy resulting in imbalance in workload.
Farm Technology	Mechanization of agriculture and increase in total household income leading to improvement in level of living.	Gender specific impact of agricultural technology leading to loss of employment of women in agriculture resulting in reducing rural women's status to a household worker with partial or complete loss of status (decision making power).
Health Technology	Planned parenthood after usage of health technology and better health seeking behaviour.	Acceptance of health technology resulting in shifting of whole burden of family planning on women - negative side effects.
Communication Technology	Exposure to mass media and contact with extension personnel and awareness of rural women regarding family planning, immunization.	Gender bias in channeling of extension services affecting women's knowledge, inefficient functioning of health care system resulting in non-utilization of these services.

1	2	3
	Positive attitude of homemakers towards introduction of technology in selected spheres which results in psychic satisfaction	Negative attitude of homemakers towards introduction of technology in selected spheres resulting in psychic dissatisfaction.

The net effect of cost and benefit of selected technology, that happen at process stage exhibited in the centre of the framework, would result as a resource outflow affecting the two major dependent variables of the study i.e. Status of Rural Women (SORW) and Family Resource Development (FRD). If the benefits outweigh the costs, it would lead to enhancement of SORW and through that FRD or directly FRD. Otherwise, SORW and FRD will diminish i.e. if the cost of technology is more than the benefit.

Following indicators were used to measure Status of Rural Women and Family Resource Development :

1. Status of Rural Women

(a) Productivity/Efficiency Status
   - i. Conservation of time
   - ii. Balance between work, leisure, rest and sleep

(b) Health Status
   - i. Time devoted to personal care
   - ii. Conservation of energy and anthropometric measurements
   - iii. Control over fertility/ planned parenthood

		iv. Better utilization of health care services
(c)	Economic Status	i. Gainful employment ii. Control over money resources iii. Ownership of assets iv. Decision making power
(d)	Cognitive Status	i. Contact with channels of mass media and extension personnel ii. Participation in community activities iii. Opinions towards progressive issues
II	Other Indicators	i. Time devoted to child care ii. Quality of consumption measured through consumption expenditure pattern of the households iii. Perception of homemakers towards cost and benefit of technology iv. Attitude of homemakers towards technology

Relative strength of cost and benefit can effect the sub-system in terms of above output that in turn will affect the outer system. In the Fig. 3.1, feedback to the household sub-system is denoted by a broken line whereas feedback to the outer system is denoted by a dark line. The feedback could act as a guideline for the various public, private and educational organizations for making technology (household, health, farm and communication) affecting the status of rural women, effective and gender neutral. For instance, the farm technology should not uproot rural women, rather it should maintain their involvement in the sector and should give them new avenues of employment. Rural women's economic independence should be maintained as status and economic

independence are positively related. It should lead to better consumption level that will improve the quality of life.

The feedback shall help the cycle to so function as to optimise the output which from the study's perspective are enhancement of Status of Rural Women and Family Resource Development. This would lead to sustainable growth and development in the macro environment (near and large).

SECTION II

3.2 Research And Sampling Design

Since the study was mainly concerned with assessing the impact of technological advancement that had taken place in macro environment due to Green Revolution in Haryana State, on the household sub-system in terms of household's access to and extent of utilization of different technology (household, health, farm, and communication) the descriptive design with a casual-comparative component was thought to be most appropriate (Best and Kahn, 1986). The nature and extent of impact was assessed and described in terms of cost and benefit (Economic, Human and Psychic) from the perspective of a) Status of Women and b). Family Resource Development.

The study incorporated in the research design a causal-comparative component to have a clear-cut derivation of the cost and benefit of the technology. This led to the selection of two districts which were diametrically opposite to each other from the point of view of technological advancement :

a. A backward village where technological advancement had not taken place, served as a control group.
b. An advanced village where technological advancement had taken place, served as a test or experimental group (Fig. 3.2).

Fig. 3.2 : Causal-Comparative Component of the Research Design

Test Area	Green Revolution ----------→	Status of Rural women and Family Resource Development after Technological Advancement (y)
Control Area		Status of Rural Women and Family Resource Development without Technological Advancement (z)

Effect of Technological Advancement = (y) - (z)

Such a design it was felt would lead to a definitive conclusion regarding the nature and impact of technological advancement on the dependent variables of the study viz., Status of Rural Women and Family Resource Development.

3.2.1 LOCALE OF THE STUDY

The study has been conducted in Haryana state of India as observed earlier (Appendix i) to which the investigator belongs.

Ever since Haryana came into existence as a separate State i.e., on 1st November' 1966 spectacular achievements have happened there particularly in the field of agriculture, Due to the spiralling effect of farm technology, combined with the increasing purchasing power, technological development in other spheres was also witnessed viz household, health and communication technology, the

utilization of which went a long way in improving the quality of life of the users. But as observed earlier, such technological advancement did not take place evenly in all parts/districts or blocks of the State. Certain blocks have remained unaffected by the Green Revolution. Keeping in line with the research design, it was thought that sampling should be such that the selected areas should work as two opposite poles.

For this purpose, nine indices of development formulated by Baruah (1979) were used to assess the level of agricultural advancement of all the districts of Haryana State (at the time of initiation of the present study, there were twelve districts in Haryana State). The indicators used for measuring development were as follows :

1. Percentage of HYV to total cropped area
2. Percentage of gross area irrigated to total cropped area
3. Amount of fertilizers per hundred hectare gross area irrigated
4. Mechanization Index (tubewells/pumpsets and tractors)
5. Productivity per hectare in rupees
6. Percentage of agricultural labour to total agricultural workers
7. Percentage of scheduled caste persons to total persons
8. Percentage of literates and educated persons to total population
9. Soil rating index

[For details of ranking of the districts of the Haryana State according to the above mentioned indicators, see Apendix ii].

After considering the agricultural development indices, and comparing those figures with figures of 1987-88 (Statistical Abstracts) district Karnal, that was at number one position and district Bhiwani, that was second from the bottom were selected for the present study.

3.2.2 SAMPLING DESIGN

A multi-stage sampling procedure (Fig. 3.3) using both probability and non-probability sampling technique was resorted to, for selection of sample households of the present investigation both from the advanced and backward locale.

Selection of blocks from the respective districts constituted the first stage using purposive sampling technique as the investigator was keen to choose the blocks that were at poles from the technological point of view (i.e. advanced and backward).

The second stage was selection of a village from each block which was also based on purposive sampling technique. This was so, because, the researcher was keen to select only those villages where rapport could easily be established with the help of government functionaries and other local resource persons. Thus, Paonti village from Karnal district and Miran village from Bhiwani district were tentatively selected. The

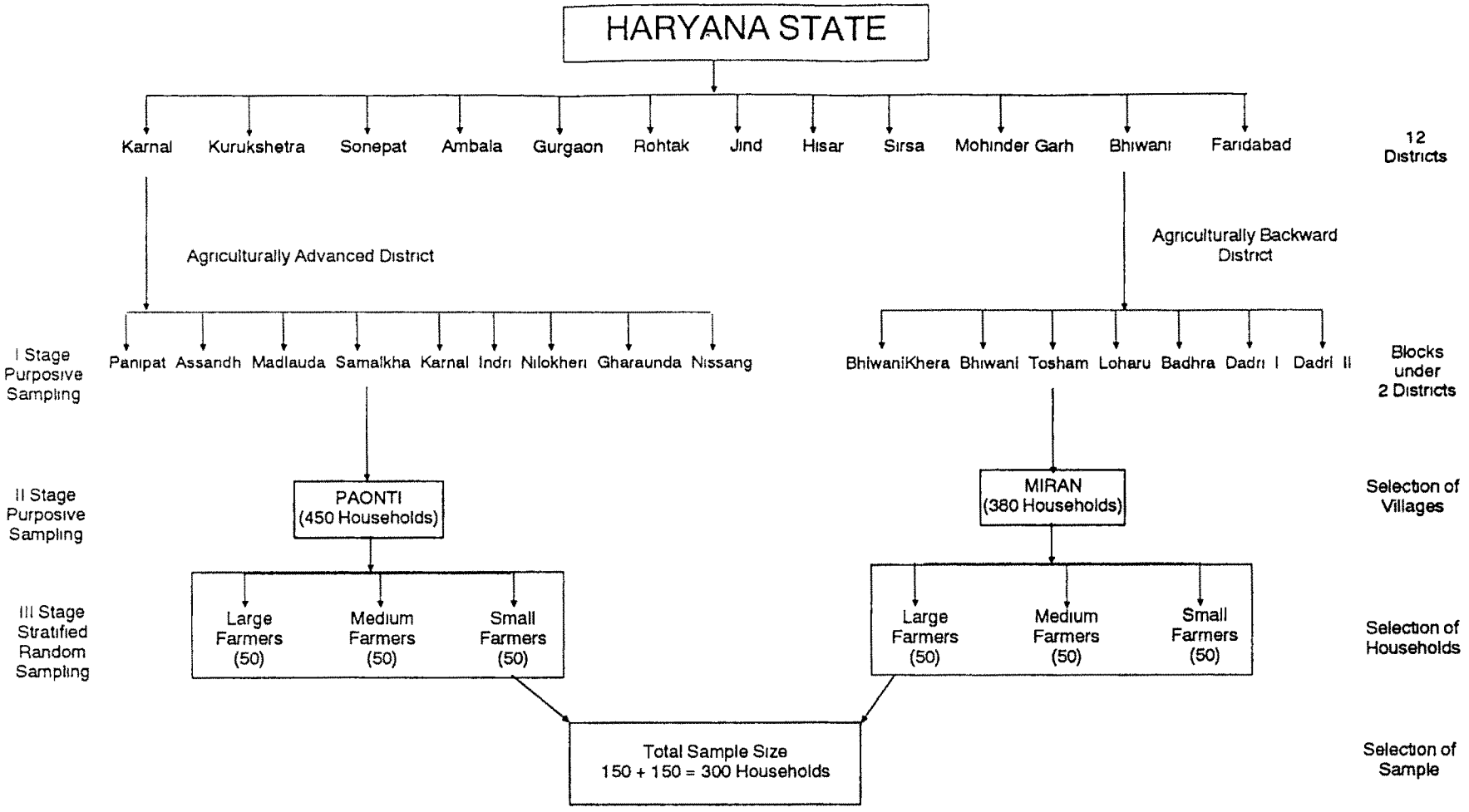

Fig 3.3 : Sampling Design Adopted For The Study

* At the time of initiation of the study there were 12 districts in Haryana State

selection was finalized after comparing the development level of these two villages by using the grass-root level indicators. (See Appendix iii, for profile of the villages and their development level). Apart from this, personal constraints such as time and money were also factors that exerted influence in the purposive selection of villages.

The third stage, which was very important, was the selection of the sample households. This was based on the probability sampling technique. Stratified random sampling technique was used for selection of sample households from both the villages of advanced and backward districts. In order to get a representative sample of the different stratum within the village, a preliminary census survey (door-to-door) of the two villages was done. There were 450 households in Paonti village of Karnal district and 380 households in Miran village of Bhiwani district from where the baseline data concerning the following aspects was collected (Appendix vi) :

a. Socio-economic and demographic profile of the population

b. Type of technology related to household, health, farm and communication available to rural population

c. Rural women's accessibility to these technology

From the data thus collected the investigator was also able to stratify the households in the respective villages on the basis of land owned by the households, categorized as under :

a.	Marginal and small farmers	-	Owning upto 5 acres of land
b.	Medium farmers	-	Owning 6 - 15 acres of land
c.	Large farmers	-	Owning more than 15 acres of land

Fifty households were selected from each stratum from each village by using random tables. This helped in giving both inter and intra group variations of the rural households. The total sample size, thus, constituted of 300 households. One hundred and fifty households from agriculturally advanced village and an equal number from agriculturally backward village.

3.2.2.1 Sample for Case Studies : Apart from the quantitative survey, the study was also supplemented with the qualitative component through case studies using anthropological method of data collection i.e., participant observation. For the qualitative survey, 12 households were purposively selected, 6 from each village that were again representative of each stratum. The qualitative survey was restricted to only ergonomic aspect of the study.

3.2.2.2 Universe of the study : Rural households from the selected villages constituted the universe of the study. Homemaker i.e., wife of the functional head of the household was the key informant for the present study. However, information regarding land, farming practices and household income was collected from male members as homemakers were unable to provide complete information on these variables.

3.2.3 DEVELOPMENT OF THE SCHEDULE

In accordance with the major objective of the study of determining the benefits and costs of selected technology on Status of Rural Women (SORW) and Family Resource Development (FRD), a pre-coded and structured interview schedule was developed (Appendix vii). It consisted of three main sections related to the elements of study as mentioned below :

3.2.3.1 Resource Inflow : The pertinent sections in the interview schedule corresponding to this element concerned itself with eliciting information on the following aspects :

a. Personal Variables : age of the homemaker, age at marriage, married life span, age difference with the spouse, educational level and work status of the homemaker.
b. Household Variables : age of the spouse, education level of the spouse, occupation of the spouse, type, size and composition of the family, size of the landholding, religion, caste, family's income, and ownership of cattle.
c. Situational Variables : Availability/Acquisition of household, health, farm and communication technology, between and within the regions.

Another division in the section I of the interview schedule was an observation checklist dealing with the housing and kitchen conditions/facilities. This was incorporated in the inflow component not only to cover the

technological aspects but also to study the ergonomic aspect such as the centre concept which will help in assessing the human cost of work in both between and within the groups.

3.2.3.2. The Process of Utilization : Information related to this component was sought in the schedule by gathering data on utilization of technologies related to household and economically extended activities as well as the pre-harvest, harvest and post-harvest activities (see Operational Definitions). This was linked with the time-activity pattern of the homemakers and the other family members in order to derive the human cost of work dimension.

The section further sought information on the usage of health (preventive and curative) services and communication services (extension personnel and mass media) by the respondents.

Information on the benefits experienced after utilizing the technologies or the problems faced after their usage was also collected under this part so as to derive the cost/benefit component both within and between the groups.

3.2.3.3. Resource Outflow : Provision was made in the schedule to gather necessary data to measure the Status of Rural Women and Family Resource Development. It contained questions which had operationalization of these two dependent variables such as :

a.	Status of Rural Women :	i)	Productivity/ efficiency status
		ii)	Health status
		iii)	Economic status
		iv)	Cognitive status
b.	Family Resource Development	i)	Qualitative aspect of consumption expenditure pattern

(For details, see the Conceptual Framework)

As was earlier observed, for assessment of psychic status/mental health vis-a-vis technology, an attitude scale was developed as mentioned below :

3.2.3.4 Development of the Scale to Measure Attitude of Rural Women Towards Technology : An attitude scale based on Likert's summated ratings was developed to measure rural women's attitude towards household, health, farm and communication technology based on their experience. Attitude is a stable mental state regarding a phenomenon after years of experience which could either be favourable or unfavourable (Edwards, 1957 and Best and Kahn, 1986). Researchers have shown that Likert type scale is less laborious and less time consuming than the one developed by Thurston (Edwards and Kenny, 1946). Standard methods explained by Edwards (1957) were adopted for construction of the attitude scale.

3.2.3.4.1 Item collection : It consisted of 60 statements covering the four dimensions of technology. Both positive and

negative statements were formulated after an extensive review of literature. Responses of the respondents were placed on a five point continuum viz., strongly agree, agree, undecided, disagree and strongly disagree which were assigned the weightage of 5,4,3,2,1 for the positive statement and the order of weightage was reversed for the negative statement. Sample of the statements covered in the scale which could reflect the attitude of the respondents are given below :

a. Household Technology :

Positive Statement : Use of modern household technologies releases women from drudgery of household tasks.

Negative Statement : Modern household technologies increase the burden of homemaker as they require more care and maintenance.

b. Health Technology :

Positive Statement : Birth control methods improve the status of women as it gives them control over fertility.

c. Farm Technology :

Positive Statement : Green revolution has improved the level of living of rural population.

Negative Statement : Mechanization of farming has thrown women out of their traditional employment.

d. Communication Technology :

Positive Statement : Extension services are geared towards welfare of rural women.

3.2.3.4.2 Content Validity of the Attitude Scale : The content validity of the statements formulated for the attitude scale was established by getting them judged by a panel of seven experts belonging to various fields like Home Management, Psychology and Sociology. They were asked to examine the statements for their clarity and relevance to the problem. Forty statements, out of the initial 60, having 70 percent consensus of the judges were retained and the remaining 20 statements were deleted.

3.2.3.4.3 Pretesting of the Schedule : The interview schedule was pretested on 30 homemakers of a non-sampled village alongwith a trial test of attitude scale.

Only minor changes were required for the final tool.

3.2.3.4.4 Reliability of the Attitude Scale : Reliability refers to the accuracy (consistency and stability) of measurement by a test (Anastassi, 1982). As it is an index of the amount of variable error in a test, the reliability of the instrument was ascertained by the established procedure.

The total scores of each respondent for each statement were computed by summing the weights of the individual item response for each statement and the total scores were arranged in an array (descending order). Thirty three percent

of the subjects with highest and lowest total scores formed the criterion group for the evaluation of individual statements. For determining the relevance of a particular statement and eliminating those which did not discriminate well between persons holding different attitudes, the critical ratio was calculated with the help of following formula :

$$t = \frac{\overline{X_H} - \overline{X_L}}{\sqrt{\frac{(X_H - \overline{X_H})^2 + (X_L - \overline{X_L})^2}{n\,(n-1)}}}$$

Where,

$\overline{X_H}$ = Mean score on a given statement for the high group

$\overline{X_L}$ = Mean score on a given statement for the low group

$(X_H - \overline{X_H})^2$ = Variance of the distribution of responses of high group to the statement.

$(X_L - \overline{X_L})^2$ = Variance of the distribution of the responses of low group to the statement.

n = Number of respondents in high and low groups.

Only those items that showed a significant difference between high and low scores were retained for the final scale (Appendix iv). Out of 40 items, 22 items were retained in the attitude scale after item analysis (Appendix vii).

3.2.3.4.5 Reliability Coefficient of Attitude Scale : Split-half technique was used to determine the reliability coefficient of the test. The coefficient of correlation between odd and even scores of 30 respondents was computed by the Pearson's Product Moment Correlation Coefficient formula. The value computed through this formula was 0.76. The reliability coefficient of the whole test was estimated by using Spearman - Brown formula (Helmstader, 1964) which is as follows :

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

where,

r_{tt} = reliability of a total test estimated

r_{hh} = correlation between halves

The reliability coefficient of the attitude scale computed was 0.86 which was found to be highly significant using the formula :

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$

t value found was

$$= \frac{0.86\sqrt{30 - 2}}{\sqrt{1 - (0.86)^2}}$$

$$= 8.90$$

It was found to be highly significant at 0.05 level (df = 28).

From the above procedure, it is therefore, clear that maximum care was taken to arrive at an appropriate research and sampling design which would help in realizing the objectives of the study.

SECTION III

3.3 Field Survey

3.3.1 CONVASSING AND BUILDING OF RAPPORT

Initially, various village level functionaries like village Sarpanch, local school teachers, aganwadi workers and few other local leaders were approached and the purpose of the study was explained to them and their help was solicited. Accompanied by the functionaries, the investigator went to the listed households that formed the sample in each locale. Acceptance of the researcher by the local people was facilitated by their presence. The fact that the researcher belonged to that area and spoke the local dialect also contributed in establishing rapport with the respondents.

Though the investigator had earlier established contact with respondents through Census survey, still before starting data collection respondent's involvement was ensured by the investigator by explaining to them the purpose of the study and its importance from community point of view at some point of time. This approach was appreciated by the respondents.

3.3.2 DATA COLLECTION

Data collection lasted from August'91 to December'91. On an average 5-6 interviews were conducted per day. Each interview lasted for 1 to 1.15 hours approximately.

3.3.2.1 The Ergonomic Component : This aspect of the study was limited to only observations of distance travelled by the respondents for execution of the unpaid family work, paid work and economically extended activities and the housing and kitchen conditions/facilities.

3.3.2.2 Distance Travelled : For assessing the distance from the residence of the respondent to place of work for execution of unpaid family work, paid work and economically extended work, the investigator accompanied the respondents while these tasks were being performed and recorded the distance travelled accordingly (in measures of 100 metres). Many respondents were able to give more or less a rough estimate of the distance travelled. This technique incidentally contributed in strengthening the rapport with respondents.

3.3.2.3 Housing and Kitchen Conditions/Facilities : Housing and kitchen conditions/facilities were minutely observed to record information about construction features and the environmental conditions in which the respondents were living. Information regarding building materials used, number of rooms, provision for lighting, water connection, toilet and separate kitchen inside the house were recorded. In case

of separate kitchen, provision of doors, windows, ventilators, lighting (general and specific), storage space, work centres, drainage system and garbage disposal were observed. Further, in the case of separate kitchens, their area in square inches was also measured with metal tape.

3.3.2.4 Anthropometric Measurements : To calculate the human cost of work in terms of energy expenditure, the anthropometric measurements of the homemakers were recorded.

3.3.2.4.1 Weight of the Homemaker : Weight was measured by means of a portable bathroom scale. The accuracy of the scale was checked periodically using 5 kg weight. The subjects were asked to stand erect on the platform without any support, looking straight. The scale was set to zero after each measurement. The weight was recorded to the nearest 0.25 kg.

3.3.2.4.2 Height of the Homemaker : Subjects were made to stand erect with heels together, parallel to the wall; with head, shoulders, buttocks and heels touching the wall. A scale was kept slightly pressed on the head. Height was marked on the wall and read off using a metal tape, to the nearest 0.1 cms.

3.3.2.5 Participatory Observation : As was earlier observed, the study incorporated qualitative approach to complement the quantitative approach and also to give enriched interpretations with real life situations. During the course

of data collection itself, care was taken to select those households for case studies who were representative of the different strata and were co-operative enough to allow the investigator to observe them while they were conducting various household tasks. The time activity pattern of the rural women was observed in reference to usage of technology by them, the work simplification techniques, if any, used by them and the utilization of the centre concept by them. Under the centre concept the preparation, cooking and sink centres, in terms of arrangement of storage and other requirements that will conserve movement and distance to be covered, were observed.

SECTION IV

3.4 Data Analysis

3.4.1 MEASUREMENT OF VARIABLES

For the purpose of analysis of data, selected variables were measured in the following way :

3.4.1.1 Housing and Kitchen Conditions/Facilities : The scores assigned to different conditions/facilities were as follows :

Nature of Occupancy

Rented	1
Owned	2

Types of House

Kutcha	1
Semi-Pucca	2
Pucca	3

Type of Material Used for Roof

Thatched	1
Tar sheets, corrugated Tin	2
Asbestos	3
RCC	4

Type of Material Used for Walls

Mud, Clay	1
Mud and Cement	2
Cement and Bricks	3

Type of Material Used for Floor

Mud	1
Mud and Cement	2
Cement	3
Cement and Tiles	4

Number of Rooms

1-4	1
5-8	2
9-12	3

Type of Kitchen

Corner of the room	1
Out door	2
Separate	3

Electricity in the House

NO	1
Yes	2

Electricity in the Kitchen

NO	1
Yes	2

Water Connection inside the House

No	1
Yes	2

Toilet inside the House

No	1
Yes	2

Separate Cattle Shed

NO	1
Yes	2

Storage Space near the Cooking Area

NO	1
Yes	2

Adequacy of Storage Space

Inadequate	1
Adequate	2

Cooking Centre

NO	1
Yes	2

Sink Centre/Platform

NO	1
Yes	2

Preparation Centre

NO	1
Yes	2

Provision for Water Disposal

NO	1
Yes	2

Provision for Garbage Disposal

NO	1
Yes	2

3.4.1.2. Adoption Level of Household Technology : In order to assess the adoption level of household technology, scores were assigned to various household items on the basis of their time and labour saving characteristic and their frequency of use by the households.

Traditional Items

Wood Stove, Manual grain grinder, Manual milk Churner, Community Well and Machette (Darati)	-	1

Semi-Modern Items

Pressure stove, Community chakki, Community water taps and Manual fodder cutter	-	2

Modern/Improved Items (Non-Electrical)

Smokeless chulah, Handpump, LPG stove and Biogas chulah	-	3

Electrical

Electric grain grinder, Electric Milk churner and Electric fodder cutter	-	4

3.4.1.2.1 Frequency of Use of Household Technological Items: Household technological items were scored in the following manner :

Rarely used - 1

Occasionally used - 2

Frequently used - 3

In order to achieve the final score, the scores achieved by each item, based on its level of modernity were multiplied by its frequency of use by the households.

3.4.1.3 Adoption Level of Agricultural Technology : Scores were assigned to various agricultural items in the following way :

Traditional		
Manual Operations	-	1
Local hand tools and mud containers	-	2
Semi-Modern		
Wooden plough, Serrated Sickle, Canal irrigation system, Bullock cart and Gunny bags	-	3
Modern		
Cultivator, Leveller, Seed driller, Herbicides, Thresher, Winnower, Trailer and Metal bins	-	4
Tubewell / Pump set	-	6
Tractor	-	7

(For modern implements, scoring pattern developed by Singh and Singh (1972) has been adopted with slight modification).

3.4.1.4 Adoption Level of Health Technology : Scoring of various family planning methods was done on the basis of their effectiveness and reliability.

Traditional/Natural Methods (Rhythm)	-	1
Semi-Permanent Methods (Copper-T, Oral Pill)	-	2
Permanent Method (Tubectomy)	-	3
Methods Adopted by Males	-	4

Though natural methods are the best as they do not have side effects but it was observed that those who were using natural methods were having large number of children which points out to the failure of this method. Similar findings have also been reported by Danda, 1985 and Bose, 1991). Hence, the method has been assigned low score than the others.

3.4.1.5. Adoption Level of Communication Technology : Following scoring pattern was adopted for determining the adoption level of communication technology.

Traditional Channels of Communication

(Friends and neighbours, Village Shopkeepers)	-	1

Extensional Personnel

(ADO,BDO, Aganwadi workers, Village health workers)	-	2

Mass Media

Radio	-	3
Television	-	4

These scores were multiplied by scores assigned to the items on the basis of their frequency of contact/use by the households (as in case of household technology).

After assigning the scores in the above mentioned manner to HHFC technology, the total scores for each technology was divided into three categories representing low, medium and high level of adoption of respective technology taking $\bar{X} \pm Sd$ as cut-off point.

3.4.1.6. Energy Expenditure Ratio : In order to measure the human cost of work, energy expenditure ratio was calculated in the following manner :

Basal Metabolic Rate (BMR) was calculated according to the subject's weight by the formula given by ICMR (1990) which is as follows :

Sex	Age (In Years)	Prediction Education*
Female	18-30	14xB.W(kg) + 471
	30-60	8.3xB.W(kg)+ 788
	> 60	10.0xB.W.(kg)+565

* 5 per cent lower than that proposed by FAO/WHO/UNU(1985).

- The average number of hours for each activity per day was calculated from the time record of rural women.

- The metabolic constant (multiple of BMR for each activity i.e., 1.6 for sedentary, 1.9. for moderate and 2.5 for heavy activities (ICMR, 1991) was multiplied with the average hours of each activity and the BMR/Hour. (Appendix v).
- These were then added up to obtain a day's energy expenditure.

3.4.2. CATEGORIZATION OF THE VARIABLES

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

3.4.2.1 Personal Variables

3.4.2.1.1 Age of the Homemaker : Age was recorded as number of completed years at the time of the interview. It was categorised as :

upto 35 years
36 - 45 years
above 45 years

3.4.2.1.2 Education Level of the Homemaker : Homemakers were categorised as :

Illiterate
Literate

3.4.2.1.3. Work Status of the Homemaker : Work status of the rural women was categorised according to the type of work

in which they were engaged. Accordingly they were categorised as :

Housewives (HWs)

Unpaid Family Workers (UPFWs)

Paid Workers (PWs)

Self-Employed (SE)

(For details, see Operational Definitions)

3.4.2.2 Household Variables

3.4.2.2.1 Age of the Spouse : Age was recorded as number of completed years at the time of the interview. It was categorised as :

upto 35 years

35 - 45 years

above 45 years

3.4.1.2.2 Education Level of the Spouse : Depending upon their literacy level, spouses were categorised as :

Illiterate

Literate/Primary

Middle

Secondary

3.4.1.2.3 Main Occupation of the Family : It refers to the occupation of the head of the household. It was categorised as follows :

Cultivator

Agricultural labourer

Herediatary/Independent Profession

Employee

3.4.1.2.4 Caste : It refers to the class or distinct hereditary order of society as was in vogue in the selected villages and was broadly categorised as :

Prestigious Caste (Brahmins, Kshatriyas and Baniyas)

Dominant Caste (Jats, who were mainly engaged in agricultural activities)

Other castes (Punjabi Khatries, Gujjars and Ahirs)

Backward and Schedule Castes/Tribes

3.4.1.2.5 Type of Family : It refers to the nature of relationship that exists between the members of the family. It was categorised as under :

Nuclear family (consisting of husband, wife and their unmarried children only).

Joint family (Consisting of husband, wife, their children and in-laws)

3.4.1.2.6 Size of the Family : This refers to the actual number of the members of the respondent's family residing under the same roof and eating from the same kitchen. It does not include the children who had left the house after marriage or expired. Based on the figures obtained through census survey family size was classified as :

Small family (2 -4 members)

Medium family (5 - 8 members)

Large family (9 - 12 members)

3.4.1.2.7. Operational Landholding : It refers to the area of land in acres cultivated by the respondent's family. The cultivated land can be either owned' by the family or leased-out' by the family. It was categorised as :

Marginal and Small Farmers (with land upto 5 acres)

Medium Farmers (with land upto 6-15 acres)

Large Farmers (with land more than 15 acres)

3.4.1.2.8. Family Income and Per Capita Income : Family income was taken as the total monthly income in money terms as noted from the various income sources of the household such as agriculture, livestock, service, labour and other services. It was categorised as :

Upto 2000 (in Rupees)

2001 - 6000

6001 - 10000

> 10000

Per Capita Income was derived by dividing monthly income with total family size. Accordingly it was categorised as :

500 (in Rupees)

501 - 1000

1001 - 1500

1501 - 2000

> 2000

3.4.1.2.9. Ownership of the Livestock It was categorised as :

No livestock

Owning Milch animals

Owning draught animals

3.4.1.2.12. Housing and Kitchen Conditions/Facilities : On the basis of scores assigned to housing and kitchen conditions/facilities as explained earlier, they were categorised as follows :

Poor	(< 8)
Average	(8 - 21)
Good	(> 21)

3.4.2.3. Situational Variables

3.4.2.3.1 Adoption Level of Technology : According to the level of adoption of various technologies viz; household, health, farm and communication, respondents were categorised as follows :

Low adopters

Medium Adopters

High Adopters

3.4.3. STATISTICAL TREATMENT OF DATA

The data were statistically analyzed employing descriptive as well as relational statistics for drawing of inferences.

3.4.3.1. Descriptive Statistics : The data were presented in percentages, measures of central tendencies (mean) and measures of dispersion (standard deviation) for analysing the following information.

a. Resource Inflow : Personal and household characteristics and availability/acquisition of HHFC technology in the household sub-system.

b. The Process : Access to and extent of use of HHFC technology and determination of adoption level of HHFC technology.

c. Resource outflow : Status of Rural Women and Family Resource Development (Indicators)

3.4.3.2. Relational Statistics : It was carried out to test the relationship between selected independent variables with dependent variables of the study. The Statistical Package for Social Science (SPSS/PC+) was used for statistical analysis. Pearson product moment correlation, analysis of variance and 't' test were employed to test the hypotheses formulated for the present study. Pearson product moment correlation was computed to find out the correlation between dependent and personal, household and situational variables under study. To study the differences among the respondents, due to selected independent variables, the analysis of variance were computed for time spent by them in performance of various activities and participation of homemakers in decision making process. When significant 'F'

values were found, Scheffe's procedure was carried out for further comparison. This procedure is widely used for making post hoc comparisons. The Scheffe's method is more rigorous than other multiple comparison method and it permits evaluation of any or all comparisions independently or not including those suggested by the outcome of the study.

In order to identify the strength of the independent variables of the study on the dependent variables of the study i.e., SORW and FRD, Multiple Regression Analysis, Stepwise was done. Initially, twelve independent variables, were included in the equation. Dummy variables used for qualitative variables are presented below :

Literacy Level of the Respondent	:	Illiterate - 0 Literate - 1
Work Status of the Respondent	:	Non-employed - 0 Employed - 1
Region	:	Backward - 0 Advanced - 1
Family Type	:	Nuclear - 0 Joint - 1

Computation of partial correlations preceded the stepwise multiple regression. Those variables showing high colinearity with the corresponding variables were not included in the equation. In Step-wise Regression Analysis each significant variable was entered one at a time in steps,

to test the independent influence of each variable, separately, one after the another, on the dependent variable. The procedure revealed 't' values suggesting true significance or non-significance of variables. Ultimately these significant factors were considered to have a distinct influence on the SORW and FRD.

Section V

3.5 OPERATIONAL DEFINITIONS

Certain terms were operationally defined for the measurement of variables of the study, which are described below :

3.5.1. Technology : For the present study technology has been defined as improvement in skills, knowledge and procedures for utilization of resources (human and non-human) for better quality of life. Here technology in four areas namely household, health, agriculture and communication have been considered (Vide Measurements of Variables).

3.5.2 Women's Work Status : It was defined according to the type of work in which women were involved. Accordingly, they were categorized as under :

3.5.2.1. Housewives (HWs) : Women involved only in housework and economically extended work.

3.5.2.2. Unpaid Family Workers (UPFWs) : Women who besides doing housework and economically extended activities, also work on their own farms.

3.5.2.3. Paid Workers (PWs) : Women involved in paid work either through self employment or wage employment or both, alongwith house work and economically extended work.

3.5.3. Agricultural Activities : Agricultural activities included :

3.5.3.1. Pre-Harvest Activities : It included activities such as spreading of FYM, levelling of land, sowing of seeds, raising of crop nursery, transplanting, irrigation activities, fertilizer application and weeding/hoeing.

3.5.3.2. Harvest Operations : It included harvesting of the crop.

3.5.3.3. Post-Harvest Operations : Threshing, Winnowing, transportation and storage of grains.

3.5.4 Status of Women : There are multifarious indicators of status of women. At macro level, the most frequently used indicators of status of women are the proportion of women to the total population, to total membership in the labour force and to total enrollment at different educational levels, with a superficial reference to political rights and social participation. These indicators are accepted at international level. Apart from these indicators following indicators were also taken for the present study such as productivity/efficiency status, health status, economic status and cognitive status (Vide Conceptual Framework).

3.5.5. Family Resource Development : Broadly speaking, it refers to the enhancement or increase or addition to family's resources in terms of money, goods and services. For the present investigation it has been restricted to status of

women, quality of consumption, time devoted to child care and positive perception of the homemakers strengthed by positive attitude towards technological impact (Vide Conceptual Framework).

3.5.6. Benefits of Technology : Benefits of technology were assessed mainly in terms of homemaker's perception of them, based on their actual experience and also in terms of Status of Women and Family Resource Development (Vide Conceptual Framework).

3.5.7. Costs of Technology : Costs of technology were also assessed on the basis of homemaker's perception, based on their actual experience and also in terms Status of Women and Family Resource Development (Vide Conceptual Framework).