Chapter 3

RESEARCH METHODOLOGY

There has been lot many question-marks about the usage and management of the water sources in the state of Punjab mainly characterized by inefficiency, unfairness and un-sustainability. The change in attitude of the people towards water utilization will be a very slow process including lot of inputs in the form of efforts. The change is possible through many ways but the education will play a key role in achieving the rational water management. In order to check the application of the above criteria it was necessary to conduct broad based survey.

To assess the urban consumer’s awareness and perception about domestic consumption of water, five towns were selected. The reasons behind the selection of these towns were that they fall in five agroclimatic zones based on the quantity of rainfall and quality of underground water. As we go from North-east to South-west, the amount of rainfall decreases and the quality of underground water also deteriorates as the total content of soluble salts and fluoride in the water increases. Thus five cities selected were Gurdaspur from zone II as zone I is a kandi area and no town worth the name (district headquarter) falls in that zone. From zone III two towns Jalandhar and Ludhiana were selected. The water table in these towns is around 90-100 ft and both the towns have high density of population and facing water scarcity. The Faridkot falls in zone IV, where rainfall is low about 40 cm and underground water is of poor quality but the water table was at about 12 ft during the period under study. The Bathinda falls in zone V climatic region where underground water contains relatively more salts as compared to all other districts and the water table was at 17 ft depth. The three cities namely Ludhiana, Jalandhar and Bathinda are managed by municipal corporations and the remaining two Gurdaspur and Faridkot were looked after by municipal committees.
3.1 THE SAMPLE

A sample is that part of the universe which we select for the purpose of investigation. A sample should exhibit the characteristics of the universe. The main focus of the study is on behaviour and perception of the domestic consumers of water in urban Punjab namely (Ludhiana, Jalandhar, Gurdaspur, Bhathinda, Faridkot). The universe is said to be the urban domestic consumers of Punjab, i.e. whole population residing in five cities of Punjab.

In the present study while taking sample it was ensured that whole of the urban population is being represented through the sample like small, medium and relatively high income residential groups. The representation of individual characteristics is must in order to generalize the result to the whole population in order to do so quota sampling technique was used. This technique strikes a compromise between a stratified and convenience sampling. In stratified sampling, the target population is divided into stratas on the basis of characteristics of population only. The population living in approved colonies was taken because in unapproved colonies and slums either the corporation water supply is not available or if available only through public taps. Thus there will not be any uniformity in the data collected.

The population of five cities of Punjab was divided into three stratas on the basis of household size, small (plot size <200 sq m), medium (200-400 sq m) and big (> 400 sq m).

The use of quota sampling technique ensured that each unit in sample is precisely represented. The quota sampling was approximated to the strength of families in natural habitat. Unlike random sampling, any member of the quota sample can be replaced by another with the same characteristics. The most important thing after this is to see how much sample size has to be taken. The sample size has been selected taking into consideration; the population to be represented, number of questions in the questionnaire to be filled, precision of the results and total quantum of work.

The survey has been restricted to the urban domestic consumers as per the objectives of the study. A sample of 100 household from each city/town under study
was taken. The total sample of 500 respondents was such that the successful completion of the survey could be envisaged. On the other hand, this research is an unfunded initiative. The cost of getting the questionnaire filled of larger sample would have been prohibitive. The proportion of respondents taken according to author would bring in accuracy of results when they are applied to the universe. Respondents selected were irrespective of the cost of getting the questionnaire filled. The information about names of the colonies was taken from corporations/ municipal committees locality in the district. The population of each city to be studied was classified into:

1. Three urban localities based on infrastructure (i.e. posh, middle level and low level)
2. Again in three localities, the plot size was taken in to consideration.

3.2 COLLECTION OF DATA

Two types of data are required for this study, viz. (i) secondary data from municipal corporations, (ii) primary data from respondents.

(i) Secondary data

The study involved consumers perception and behaviours about domestic water use in urban areas. Therefore before studying the respondent’s view it is imperative to know and discuss the existing water supply system. The data regarding the number of households being supplied water, source of water supply, viz. tubewells/canal, duration of daily supply, water purification treatment and cost charging etc. was collected from the municipal corporation on the basis of secondary data.

(ii) Primary data

The primary data regarding awareness and perception is to be collected from the respondents of five selected cities. For which a questionnaire was designed using Lehman et al. (1997) technique (Fig. 3.1).
The questionnaire was divided into five parts taking into consideration the four objectives of the study and personal correlates of the respondents.

Fig 3.1 Steps for Questionnaire Design (Lehman et al. (1997:171)

3.2.1 The existing water use

In this section the objective is to know the existing water use by the population. Thus it was desirable to know the sources of water supply, i.e. whether corporation water supply is used or own hand pump or submersible pump is used or bottled water is used for drinking purposes. After source then comes the question of how much water is used for what purpose which means that quantity of water used for drinking, cooking, bathing, washing, vehicle washing, gardening and any other use like pets etc. Some urbanities have the habit of washing vehicles. Vehicle washing consumes significant amount of water thus information about number, types of vehicle and frequency of washing is necessary to work out the quantity of water used. Next question was about the peoples/respondents perception about the, parameters used to judge the quality of water. To improve the quality of water some residents use water filters. Therefore the next question was regarding the use of water filter. Then opinion about the improvement of water quality with water filters. The next question was about the frequency of breakdown of corporation supply and time taken to restore water supply. Information was also sought from respondents about the alternative
arrangements during breakdown of corporation supply. The respondents opinion was also sought on improvements required in the existing water supply, optimum duration of water supply and preference for corporation supply viz. a viz. own supply or both. The peoples satisfaction level about water supply was also needed so the last question in this section was, are you satisfied with the present water supply system.

3.2.2 User’s awareness about water

Water is essential for existence of every living being on this earth but how much user’s know about its sources and availability need to be studied. So the second section pertained to awareness of respondents about water. The questions were, are you aware of hydrological cycle; how much earth’s surface is covered with water; the percentage of fresh water available for drinking and crop cultivation; percentage of fresh water frozen as ice; number of rivers flowing in the present Punjab; the depth of ground water in your respective city; is water table going up or down; what is good quality water; opinion about the quality of water you used.

The water is also classified as hard water and soft water so the respondent’s opinion was sought about, which of these water is good for human health. Having sought this opinion the next question to test the knowledge that what make the water hard or soft. The same question was slightly modified to seek more information, viz. which of these two, hard water and soft water is good for domestic use and for crops. The next question was how you prioritize the different domestic needs for water use. Although a water is a basic necessity for all but even then respondents opinion was sought on whether the increase in income increases the water consumption. The respondents views were also sought on future availability of water, demand, and imposing of restrictions to check the wastage of water. The respondents views were also sought on water requirement to produce fruits/vegetables for our daily requirement viz. domestic requirement and position of water supply in times to come.
3.2.3 Economy in water use

The third section pertained to consumer’s perception about economy in water use. The questions were existing water use per person per day and the requirement of water if water is to be priced at Rs. 1 per litre. The information was sought for both the seasons, i.e. summer as well as winter. The opinion of the respondents was sought that whether to keep the demand under check water needs to be priced, if price is to be charged what should be the rate per kilo litre. If price is not to be charged what other measures need to be taken by corporation to economize on its use. The opinion of respondents were also sought on the types of costs covered in the present water charges recovered by the municipal corporations. The opinion was also sought on that whether the price of water should increase with its use. At present water supply schemes are designed @ 75 litres per person per day (lpcd). The opinion of respondent was sought that whether 75 lpcd is sufficient or not. The use of waste water will help in economizing the fresh water use. The opinion of the respondents was sought to have a separate sewer line for washing and bathing waste water so that this can be used by minimum treatment.

3.2.4 Recycling of water

The next section was about recycling of waste water. The first question was about awareness of recycling of water and the second was about how the corporations dispose of sewerage waters at present. The perception of respondents about use of fresh water for flushing toilets, irrigating lawns and crops was also studied. The fourth question was to know the opinion of respondents about the use of recycled water for flushing toilets; double flushing (first flushing with recycled water and then rinse with small quantity of fresh water) and irrigating lawns. The opinions of respondents were also sought that if fresh water is charged and the recycled is free than will you be able to use the latter for flushing and irrigating lawn. Since rain water also goes waste therefore opinion of respondent was sought regarding harvesting of rain water.
3.2.5 Personal correlates

Personal correlates such as age, gender, educational qualification, marital status, size of family in a household, occupation and income of the household were also included in the questionnaire. This information was needed for socio-economic analysis of the data.

An English as well as Punjabi version of the questionnaire was prepared for the convenience of the respondents.

The questionnaire after being designed was tested before actually conducting the survey. Five intellectuals with academic background were requested to go through the questionnaire and point out the discrepancies if any. The idea of pretesting was to find out whether the respondents will be able to understand the question in the same sense as the researcher has attempted to. After this, ten respondents were asked to fill the questionnaire so as to find whether they understand the questions in same sense as the researcher has tried to convey. This pre-testing helped the researcher to eliminate any disparity in the beginning only. After this the questionnaire was got filled from the sample respondents.

3.3 ANALYSIS OF THE DATA AND INTERPRETATION

The response of the respondents was tabulated in a two way tables to bring out the effect of the city to city variation and size of the household on the collected data. Since sample size slightly varied in three segments of households i.e. small, medium and high, so to bring uniformity percentages were worked out to make the comparison easier. Mean values were worked out to compare the effect of household size and city. The following statistical tools were used to interpret the data.
3.3.1 Analysis of Variance

Analysis of variance was done to ascribe the variation to the two factors studied, i.e. city and household. Part of the data was also tabulated on ‘Likert Scale’ and ‘Index value’ was worked out to give statistical treatment to the data.

### ANOVA

<table>
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<th>Source of Variant</th>
<th>Sum of squares</th>
<th>Degree of freedom</th>
<th>Mean sum of squares</th>
<th>F-Ratio</th>
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<tbody>
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<td>SSC</td>
<td>5-1=4</td>
<td>MSC/4</td>
<td>MSC/MDE</td>
</tr>
<tr>
<td>Between household</td>
<td>SSH</td>
<td>3-1=2</td>
<td>MSH/2</td>
<td>MSH/MSE</td>
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<tr>
<td>Error</td>
<td>SSE</td>
<td>(5-1)(3-10=8</td>
<td>MSE=SSE/8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>SST</td>
<td>n-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SSC= Sum of square between cities  
SSH= Sum of squares between households  
SSE= Sum of square due to errors= (SST-SSC-SSH)  
SST= Total Sum of squares

3.3.2 Multiple Regression Analysis

To study the effect of demographic features on the awareness level of respondents multiple regression equations were developed. In addition the relationship between awareness level and satisfaction level with respect to water supply were also studied. Correlation coefficient was worked out between awareness and satisfaction level.
3.3.3 Chi Square Test

The chi square test was used to study the association between awareness and satisfaction regarding water supply and other aspects in different districts and the state. Similarly this test was also used to study the association between satisfaction regarding water supply/consumption and opinion about priced water in different districts.

3.3.4 Paired ‘t’ test

Paired ‘t’ test was used to test the significance of variation between water consumption at present prices and if priced at Rs. 1/- per litre. This test was also used to study the variation in water consumption between two seasons i.e. summer and winter.

3.4 REFERENCE