III METHODOLOGY

Research methodology is the key to a systematic research and ensuing solutions. It specifies the framework of research design, sampling procedure, methods of collection and analysis of data. In this chapter, the methodology followed for the present study entitled “Stress Assessment and Management among Rural and Urban Fisherwomen in Puducherry” is described under the following five major headings:

A. Selection and profile of the study area
B. Selection of sample
C. Methods of data collection
D. Intervention study
E. Analysis of data

A. Selection and Profile of the Study Area

The Puducherry district of the Union Territory of Puducherry has been chosen for the study. A brief description of the location and fisheries wealth of the Union Territory of Puducherry as a whole and the Puducherry district in particular is given below:

Location: The Union Territory of Puducherry comprises of four regions namely Puducherry, Karaikal, Mahe and Yanam, which are not geographically contiguous. Puducherry region is located in the East Coast, about 162 kms south of Chennai. This is the largest among the four regions and consists of 12 scattered areas interspersed with enclaves of Villupuram and Cuddalore districts of Tamil Nadu. Karaikal region is about 160 kms. south of Puducherry and is bounded by Nagapattinam and Thiruvarur districts of Tamil Nadu State. Mahe region lies almost parallel to Puducherry 653 kms away on the west coast near Kannur district of Kerala state. Yanam is located about 840 kms. North-East of Puducherry in the East Godhavari district of Andhra Pradesh state. The Union Territory of Puducherry is administered under the provisions of Government of Union Territories Act, 1963.

In 2005, the erstwhile district of Puducherry was bifurcated into two districts viz., Puducherry district and Karaikal district (vide Revenue Dept.
order No. 19291/rev/ro/e1/2005 dt 12.05.2005) to provide efficient administration in the context of growing population and needs. The outlying regions of Mahe and Yanam were made to continue to be with Puducherry district. Puducherry, is the capital of the UT.

**Administrative structure:** The Union Territory consists of 264 census villages, 129 revenue villages, 6 taluks (4 in Puducherry and 2 in Karaikal) and 2 sub-taluks (Mahe and Yanam). To ensure effective and efficient administration, the Territory is further divided into six blocks namely

(i) Ariyankuppam (Karikalampakkam)  
(ii) Oulgaret (Reddiarpalayam)  
(iii) Villianur  
(iv) Karaikal  
(v) Mahe and  
(vi) Yanam consisting of 47 circles of village level units. Puducherry Panchayat’s Act of 1973 and Municipalities Act of 1973 came into force in 1974. There are five municipalities, namely Puducherry, Oulgaret, Karaikal, Mahe and Yanam. There are 10 Commune panchayats, namely, Villianur, Mannadipet, Ariyankuppam, Bahour, Nettapakkam, Tirunallar, Neravy, Nedungadu, Kottucherry and Thirumalairayan Pattinam.

**Agriculture and Fisheries:** Agriculture including fisheries is the most important sector that provides livelihood for majority of the population in this Union Territory, with a total coastal line of 45 kms long and 1000 sq.km of continental shelves, enriched with marine fisheries potential. The fisheries statistics of Union Territory of Puducherry at a glance are given in Table II.
### TABLE II

**FISHERIES STATISTICS OF THE UNION TERRITORY OF PUDUCHERRY AT A GLANCE**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Puducherry</th>
<th>Karaikal</th>
<th>Mahe</th>
<th>Yanam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coastal Length (kms)</td>
<td>24</td>
<td>20</td>
<td>1</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>2. Fishing Villages (Nos.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Marine</td>
<td>15</td>
<td>10</td>
<td>3</td>
<td>11</td>
<td>39</td>
</tr>
<tr>
<td>b) Inland</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>c) Total</td>
<td>25</td>
<td>11</td>
<td>3</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>3. Population (Nos.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Marine</td>
<td>51,350</td>
<td>17,265</td>
<td>4,000</td>
<td>12,385</td>
<td>85,000</td>
</tr>
<tr>
<td>b) Inland</td>
<td>9,270</td>
<td>1,197</td>
<td>-</td>
<td>-</td>
<td>10,467</td>
</tr>
<tr>
<td>c) Total</td>
<td>60,620</td>
<td>18,462</td>
<td>4,000</td>
<td>12,385</td>
<td>95,467</td>
</tr>
<tr>
<td>4. Fishermen Families (Nos.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Marine</td>
<td>11,849</td>
<td>3,361</td>
<td>750</td>
<td>4,000</td>
<td>19,960</td>
</tr>
<tr>
<td>b) Inland</td>
<td>1,807</td>
<td>233</td>
<td>-</td>
<td>-</td>
<td>2,040</td>
</tr>
<tr>
<td>c) Total</td>
<td>13,656</td>
<td>3,594</td>
<td>750</td>
<td>4,000</td>
<td>22,000</td>
</tr>
<tr>
<td>5. Fishing Crafts (Nos.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Wooden Mechanized Boats</td>
<td>120</td>
<td>98</td>
<td>13</td>
<td>43</td>
<td>274</td>
</tr>
<tr>
<td>b) Steel Mechanized Boats</td>
<td>4</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>23</td>
</tr>
<tr>
<td>c) FRP Mechanized Boats</td>
<td>84</td>
<td>-</td>
<td>3</td>
<td>89</td>
<td>176</td>
</tr>
<tr>
<td>d) FRP Cattamaram Motorized</td>
<td>709</td>
<td>519</td>
<td>120</td>
<td>57</td>
<td>1405</td>
</tr>
<tr>
<td>e) Wooden Cattamaram With OBM</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>f) Wooden Cattamaram Without OBM</td>
<td>641</td>
<td>176</td>
<td>-</td>
<td>876</td>
<td>1693</td>
</tr>
<tr>
<td>g) Total</td>
<td>1,558</td>
<td>912</td>
<td>136</td>
<td>1,065</td>
<td>3,671</td>
</tr>
<tr>
<td>6. Fisherman Co-operative Societies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Apex</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>b) Central</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>c) Primary Fishermen Societies</td>
<td>28</td>
<td>10</td>
<td>1</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>d) Primary Fisherwomen Societies</td>
<td>4</td>
<td>6</td>
<td>1</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>e) Total</td>
<td>33</td>
<td>17</td>
<td>2</td>
<td>14</td>
<td>66</td>
</tr>
<tr>
<td>7. Member Enrolled in FCS (Nos.)</td>
<td>33,161</td>
<td>10,309</td>
<td>2,641</td>
<td>8,912</td>
<td>54,613</td>
</tr>
<tr>
<td>8. Minor Fishing Harbour (Nos.)</td>
<td>1</td>
<td>1</td>
<td>1 (Nearing Completion)</td>
<td>1 (under construction)</td>
<td>1 (construction work commence shortly)</td>
</tr>
</tbody>
</table>

*Source: Department of Fisheries and Fishermen Welfare (Base year: 2011)*

The Union Territory of Puducherry has a fisherfolk population of about 95,467. In Puducherry, 13,000 fishermen are actively engaged in fishing in 39 marine fishing villages and 11 inland fishing villages. The territory has
675 Sq.km of inshore waters, 1347 hectares of inland water and 800 hectares of brackish water fisheries. The marine fish catch has increased from 31500 metric tonnes in 2005 to 33480 metric tonnes in 2006. The inland fish catch continues to be 5500 metric tonnes in 2006. The fish production level of 900 metric tonnes during 1954, has recorded over 40 times increase to 38980 metric tonnes during 2006. Puducherry district has got the fisherfolk population of 60620 distributed in 15 marine fisher villages and 10 inland villages. The names of fisherfolk villages and the fisherfolk population for Puducherry district are furnished below, in Table III.

TABLE III
MARINE AND INLAND FISHERFOLK POPULATION IN PUDUCHERRY DISTRICT

<table>
<thead>
<tr>
<th>Name of the village</th>
<th>Population</th>
<th>Name of the village</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanagachettikulam</td>
<td>1155</td>
<td>Poornankuppam</td>
<td>395</td>
</tr>
<tr>
<td>Peria kalapet</td>
<td>3850</td>
<td>Murungapakkam</td>
<td>2635</td>
</tr>
<tr>
<td>China kalapet</td>
<td>2185</td>
<td>Nellithope</td>
<td>895</td>
</tr>
<tr>
<td>Pillaichavady</td>
<td>1965</td>
<td>Ariyankuppam</td>
<td>1889</td>
</tr>
<tr>
<td>Solai nagar</td>
<td>4170</td>
<td>R.K. Nagar</td>
<td>2074</td>
</tr>
<tr>
<td>Vaithikuppam</td>
<td>3930</td>
<td>Villianur</td>
<td>260</td>
</tr>
<tr>
<td>Kurusukuppam</td>
<td>2995</td>
<td>Manaveli</td>
<td>370</td>
</tr>
<tr>
<td>Vambakeerapalayam</td>
<td>8300</td>
<td>Ariyur</td>
<td>155</td>
</tr>
<tr>
<td>Veerampattinam</td>
<td>10260</td>
<td>Katterikuppam</td>
<td>80</td>
</tr>
<tr>
<td>China veerampatinam</td>
<td>835</td>
<td>Nettapakkam</td>
<td>220</td>
</tr>
<tr>
<td>Pudukuppam</td>
<td>1740</td>
<td>Puducherry Urban</td>
<td>297</td>
</tr>
<tr>
<td>Nallavadu</td>
<td>3435</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pannithittu</td>
<td>2650</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narambai</td>
<td>1905</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moorthikupam</td>
<td>1975</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51,350</strong></td>
<td><strong>Total</strong></td>
<td><strong>9270</strong></td>
</tr>
</tbody>
</table>

B. Selection of the Sample

Puducherry State is taken as the universe for the present study. Among the four regions in the state, Puducherry district was selected purposively. The villages were stratified into rural and urban areas. In Puducherry district, there were 15 marine fishermen villages and those
villages which come under panchayats were considered as rural areas and the villages that come under Municipalities were termed as urban areas. Thus, there were seven villages in rural area, and eight villages in urban area as detailed below, in Table IV.

TABLE IV
LIST OF FISHERMEN VILLAGES IN PUDUCHERRY DISTRICT
STRATIFIED INTO URBAN AND RURAL AREAS

<table>
<thead>
<tr>
<th>Name of the fishermen villages</th>
<th>No of Families</th>
<th>Population (in number)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veerampattinam</td>
<td>2032</td>
<td>10260</td>
</tr>
<tr>
<td>Nallavadu</td>
<td>665</td>
<td>3435</td>
</tr>
<tr>
<td>Pannithittu</td>
<td>530</td>
<td>2650</td>
</tr>
<tr>
<td>Moorthikuppam</td>
<td>393</td>
<td>1975</td>
</tr>
<tr>
<td>Narambai</td>
<td>381</td>
<td>1905</td>
</tr>
<tr>
<td>Pudukuppam</td>
<td>346</td>
<td>1740</td>
</tr>
<tr>
<td>Chinnaveerampattinam</td>
<td>167</td>
<td>835</td>
</tr>
<tr>
<td><strong>Urban area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vambakeerapalayam</td>
<td>1640</td>
<td>8300</td>
</tr>
<tr>
<td>Solainagar</td>
<td>812</td>
<td>4170</td>
</tr>
<tr>
<td>Periakalapet</td>
<td>766</td>
<td>3850</td>
</tr>
<tr>
<td>Vaithikuppam</td>
<td>766</td>
<td>3930</td>
</tr>
<tr>
<td>Kurusukuppam</td>
<td>599</td>
<td>2995</td>
</tr>
<tr>
<td>Chinakalapet</td>
<td>417</td>
<td>2185</td>
</tr>
<tr>
<td>Pillaichavady</td>
<td>391</td>
<td>1965</td>
</tr>
<tr>
<td>Kanagachettikulam</td>
<td>231</td>
<td>1155</td>
</tr>
</tbody>
</table>

*Source: Records of Fisheries Department of Puducherry (Base year: 2011)*

Two villages, one from urban area and one from rural area, were selected by random sampling method. Thus, Veerampattinam, a rural village and Solainagar, an urban fishing village were selected for the present study. Incidentally, the rate of fishing activities was high in both these villages. Map showing the selected fishermen villages in Puducherry district is given in Figure 5.
Figure 5. Map showing the selected fishermen villages in Puducherry district
The women who were involved only in fishing related activities for the last two or more years were listed. From the list, 220 fisherwomen, each from Veerampattinum and Solainagar totaling 440 sample fisherwomen were selected, using random table. Thus, a multi-stage stratified random sampling procedure was followed.

C. Methods of Data Collection

The data were collected from both primary and secondary sources. The primary data were collected from the ultimate respondents through interview method and quasi-experimental or interventional methods. Each method is described below:

1. Interview method: The primary data were collected in a pre-tested interview schedule through interview method (Appendix I). The details on the socio-economic characteristics, investments, savings and loans, decision making practices among the fisherwomen, multiple role of fisherwomen, assessment of levels of stress and nutritional status, factors that caused stress and the coping mechanisms followed by fisherwomen themselves in mitigating stress were collected.

2. A standard, validated Depression, Anxiety and Stress Scale: (DASS 42 Lovinbond and Lovinbond, 1995) was used to assess the stress level. The DASS was a 42 items questionnaire, which included three self-report scales designed to measure the negative emotional status of depression, anxiety and stress. Each of the three scales contained 14 items, divided into sub-scales of 2 to 5 items with similar content. Four point severity/frequency scales were used to rate the extent to which they had experienced each state over the past week.

Scores of Depression, Anxiety and Stress were calculated by summing up the scores for the relevant items. The depression scale items were 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, and 42. The anxiety scale items were 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, and 41. The stress scale items were 1, 6, 8, 11, 12, 14, 18, 22, 27, 29, 32, 33, 35, and 39. The score for each of the respondents over each of the sub-scales was then evaluated as per the severity-rating index given below.
### TABLE V

**SEVERITY - RATING INDEX**

<table>
<thead>
<tr>
<th>Level</th>
<th>Depression</th>
<th>Anxiety</th>
<th>Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0 – 9</td>
<td>0 – 7</td>
<td>0 – 14</td>
</tr>
<tr>
<td>Mild</td>
<td>10 – 13</td>
<td>8 – 9</td>
<td>15 – 18</td>
</tr>
<tr>
<td>Moderate</td>
<td>14 – 20</td>
<td>10 – 14</td>
<td>19 – 25</td>
</tr>
<tr>
<td>Severe</td>
<td>21 – 27</td>
<td>15 – 19</td>
<td>26 – 33</td>
</tr>
<tr>
<td>Extremely severe</td>
<td>28+</td>
<td>20+</td>
<td>34+</td>
</tr>
</tbody>
</table>

For this purpose, a pilot study among 20 respondents was conducted outside the study area and the interview schedule was modified accordingly. The investigator collecting data from the selected fisherwomen has been depicted in Plate 1.

The related secondary data were also collected from the published sources. The results obtained in the study on hand were compared with the norms to assess the levels of depression, anxiety and stress.

During interview, good rapport was established between the respondents and the researcher. All the participants were explained about the purpose of the study and were ensured strict confidentiality. Verbal consent was taken from all the respondents prior to the commencement of the study. During interview with the respondents, the data were collected through observation as well.

### 3. Measuring the height and weight for BMI

The nutritional status of the respondents was also assessed by employing the standard procedure of working out the **Body Mass Index (BMI)**. It is a measure of the relationship of weight-to-height. It was a mathematical formula, in which a person’s body weight in kilograms was divided by the square of the height in meters. Body Mass Index (BMI) was correlated with more body fat than any other indicator like height and weight. The following formula was employed in calculating the BMI.

\[
\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}
\]

For this, the details on the height and weight of the individual respondent were gathered.
Discussion with the Director, Fisheries Department, Puducherry

Collection of data from the fisherwoman

Plate I
Data Collection
60
D. Intervention Study

The stress mitigation practices followed by the respondents on their own of the chosen sample fisherwomen were assessed. Based on that, training needs were assessed. Accordingly, a training programme on ‘stress management’ was planned and implemented among the sample fisherwomen and the impact was evaluated.

Appropriate training on “Stress mitigation through capacity building” was planned and organised for the sub-set of sample fisherwomen, with the objective of building their capability of preventing and managing stress by themselves. The intervention study was carried out in three phases as detailed below.

Phase I: Planning the training programme
Phase II: Implementing the training programme
Phase III: Impact of the training programme

Each phase of the training programme is described below:

Phase I: Planning the training programme

Sub-samples of N=20 from Veerampattinum and N=20 from Solainagar were purposively selected from the total sample fisherwomen in the respective villages. The sample belonged to the age group of 30 to 55, having two and more years of experience in fish related activities, were purposively selected for this training programme. The plan of work followed in conducting the training programme, is given in Table VI.
## TABLE VI

**PLAN OF WORK FOLLOWED FOR THE TRAINING PROGRAMME ON STRESS MANAGEMENT**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Date R/U</th>
<th>Topic</th>
<th>Content</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24/10/12* 5/03/2013**</td>
<td>Nutrition for optimum health</td>
<td>Balanced diet, nutritious recipe, deficiency diseases, personal hygiene.</td>
<td>PowerPoint presentation and result demonstration</td>
</tr>
<tr>
<td>2</td>
<td>25/10/12* 6/03/2013**</td>
<td>Stress management</td>
<td>Meaning, causes and consequences of stress, stress management techniques to prevent stress, physical exercise, Twin hearts meditation</td>
<td>Lecture, Demonstration and Compact disc</td>
</tr>
<tr>
<td>3</td>
<td>25/10/12* 6/03/2013**</td>
<td>Value added fish products</td>
<td>Hygienic handling of fish 10 fish products</td>
<td>Lecture and result demonstration</td>
</tr>
<tr>
<td>4</td>
<td>26/10/12* 7/03/2013**</td>
<td>Disinfectant products</td>
<td>Phenol and soap oil making</td>
<td>Lecture and result demonstration</td>
</tr>
<tr>
<td>5</td>
<td>27/10/12* 8/03/2013**</td>
<td>Time management, Family counseling</td>
<td>Meaning, how to plan and use time effectively. Family problems and solutions</td>
<td>Lecture and group dynamics counselling</td>
</tr>
<tr>
<td>6</td>
<td>28/10/12* 9/03/2013**</td>
<td>Solid waste management</td>
<td>Meaning, concept, and need for solid waste management</td>
<td>Lecture and documentary film</td>
</tr>
<tr>
<td>7</td>
<td>29/10/12* 10/3/2013**</td>
<td>Legal education</td>
<td>Women and law</td>
<td>Lecture</td>
</tr>
<tr>
<td>8</td>
<td>30/10/12* 11/3/2013**</td>
<td>Occupational health hazard and disaster management</td>
<td>Meaning, causes, consequences and management</td>
<td>Lecture</td>
</tr>
</tbody>
</table>

R- Rural; U-Urban: *Relates to Veerampattinam rural village; **Relates to Solainagar urban village

Twin Hearts Meditation source: Sui, C.K. (2012)

### Meditation on Twin Hearts

Meditation on Twin Hearts for Peace and Illumination is a powerful meditation technique that brings peace, love joy and goodwill to Mother Earth. It is also aimed at achieving divine consciousness or illumination. The “twin hearts” refer to the heart and crown energy centers or chakras. The heart energy center is the center of human love and seat of higher emotions. The crown energy center (also called the spiritual heart) is the center of divine love and gateway to higher spiritual consciousness. The crown center can only be sufficiently activated when the heart center is first fully activated. Divine love can only be experienced when higher refined emotions are fully expressed. When the heart and crown centers are highly developed, one experiences...
divine love and oneness with all. It has been explode as a way of reducing stress on both mind and body.

**Phase II: Implementing the Training Programme**

The training programme was implemented by the investigator systematically to the target group. Prior information regarding the training programme was given to the selected participants in both rural and urban areas (Plate 2 and 3). In Veerampattinam, there is a Village Knowledge Centre (VKC) of M.S. Swaminathan Research Foundation (MSSRF), functioning in the Panchayat building. In Veerampattinam, the programme was conducted in VKC and community hall with all inherent infrastructural facilities. In Solainagar village, the Panchayat President was approached and permission was taken from him to conduct the training in the building attached to the temple premises was used as a venue at Solainagar. Identical procedure was repeated in both sample villages.

The training was conducted during the respondent’s free time, after 2.30 pm in both areas. Necessary resources were mobilized and the infrastructural facilities were provided to the participants and they gave ample co-operation. Names of resource persons have been listed in Appendix II. Before initiating the training programme, participant’s knowledge on all aspects was assessed by using a check list (Appendix III). As per the plan of work, the training programme was conducted for seven days. Appropriately prepared, Information, Education and Communication (IEC) materials were used to impart training on various aspects of mitigating stress at both the places. All the selected subjects were instructed to do physical exercise and twin hearts meditation for a period of three months, weekly twice under researcher’s supervision. The Compact Disc (CD) on Twin Hearts Meditation was also handed over to the team. Village Knowledge Center (VKC, MSSRF) at Veerampatinam was having a system. In Solainagar, Panchayat President made arrangements for the DVD player.

**Phase III: Impact of the Training Programme**

Impact of the training was assessed among 40 selected/ trained participants. The feedback was collected from the participants after each session. After three months, the impact was assessed through measurement of their knowledge on topics covered in the training programme by re-administering the same check list. Likewise after three months of practicing physical exercise and meditation, DASS Scale was used to measure the stress level again and the stress scores were tabulated and given in Appendix IV.
Imparting nutrition education

Lecture and discussion on stress management

Teaching physical exercise

Twin hearts meditation

Hygienic handling of fish

Preparation of value added fish products

Display of value added fish products

Training on phenyl and soap oil making

Education on time management and family counselling

Documentary film on solid waste management

Creating legal awareness

Training on occupational health hazard and disaster management

Training on ‘Stress Management’ at Veerampattinam Rural Village

Plate 2
Training on ‘Stress Management’ at Solainagar Urban Village

Plate 3
E. Analysis of Data

The collected data were subjected to both simple statistical and functional analysis as described below.

1. Simple statistical analysis

The data collected were codified, classified, tabulated and analysed. The following simple statistical tools using Statistical Packages for Social Sciences (SPSS), Version 17.0 wherever needed, were employed to analyse the appropriate data.

a. Frequency Analysis
b. Percentage and Average Analysis
c. Chi-Square test
d. Correlation Analysis
e. Friedman’s test
f. Paired ‘t’ test
g. Independent sample ‘t’ test

The findings from the analysis of data were suitably interpreted and accordingly the conclusions were drawn. Each of the above tools is briefly described below:

a. Frequency and percentage analysis: Frequency and percentage analyses were employed to know the distribution pattern of the respondents in respect to different variables like age, education etc.

b. Average and percentage score analysis: Scores were given to the responses based on the five points scale and the scores were multiplied with frequency to get the total score. The average (percentage) of total score was known as average (percentage) score.

\[ \text{Total score} = N_1 \times \text{score}_1 + N_2 \times \text{score}_2 + \ldots \]

\[ \text{Average percentage score} = \frac{100 \times \text{(Total score)}}{\text{Maximum score}} \]
c. Chi-square Test: It was used to test the association between the independent variables and the dependent variable. The following formula was employed to calculate the chi-square value:

\[ \chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{\Sigma_{ij}} \]

Where;
- O-observed frequency
- E-expected frequency

d. Correlation Analysis: It was done to test the existence of relationship between two variables and the formula employed to calculate the correlation co-efficient is given below:

\[ r = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}} \]

Where; \( r \) = co-efficient of correlation between variables \( X_i \) and \( Y_i \)
- \( \sum X_i \) = sum of the scores on first variable
- \( \sum Y_i \) = sum of the scores on second variable
- \( \sum X_i^2 \) = the sum of the squares of the first variable
- \( \sum Y_i^2 \) = the sum of the squares of the second variable
- \( \Sigma X_i Y_i \) = the sum of product of scores of two variables
- \( n \) = number of observations for each variation

e. Friedman’s test: It was employed for comparing three or more related samples and it makes no assumptions about the underlying distribution of the data. The data was set out in a table containing rows by \( k \) columns. The data were then ranked across the rows and the mean rank for each column was compared. The differences between the sum of the ranks was evaluated by applying the Friedman’s test.

\[ \chi^2_F = \frac{12}{nk(k+1)} \sum R^2 - 3n(k+1) \]
which follows chi square distribution with k-1 degrees of freedom.
Where: R = sum of rank
        n = sample size
        k = number of items

f. Paired t-Test: The t-test based on paired observation was defined by the following formula:

\[ t = \frac{\bar{d} \sqrt{n}}{s} \]

Where; \( \bar{d} \) = the mean of difference
        S = the standard derivation of the differences

The value of S was calculated employing the following formula

\[ S = \sqrt{\frac{\sum(d-\bar{d})^2}{n-1}} \]

The findings which emerged from the analysis of data were suitably interpreted and necessary conclusions and inferences were drawn.

g. Independent sample ‘t’ Test

The t-test was designed to test the significance of the difference between two means. The procedure for computing t-test assumed that the data are normally distributed. The formula employed was:

\[ t = \frac{|\bar{x}_1 - \bar{x}_2|}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \]

Where, \( S = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2}} \)

which followed student t-distribution with \( n_1 + n_2 - 2 \) degrees of freedom, where, \( \bar{x}_1 \) was the mean of the first sample, \( \bar{x}_2 \) was the mean of the second and S was the combined standard deviation. Using the above formula, t-statistic was computed along with the p-value so that the confidence level of significance of the difference might be interpreted in a given context.
2. Functional Analysis

The collected data were further subjected to functional analysis. The multiple regression analysis and discriminant analysis were carried out.

a. Multiple regression analysis

Regression analysis is concerned with the derivation of an appropriate mathematical expression for finding values of a dependent variable on the basis of independent variables. It is thus designed to examine the relationship of a variable $Y$ to a set of other variables $X_1, X_2, X_3, \ldots, X_n$. The most commonly used linear equation in $Y = b_1 X_1 + b_2 X_2 + \ldots + b_n X_n + b_0$. Here $Y$ is the dependent variable, which is to be found, $X_1, X_2, X_3, \ldots$ and $X_n$ are the known variables with which predictions are to be made and $b_1, b_2, \ldots, b_n$ are coefficients of the variables. Multiple linear regression equation thus was used to determine the extent of influence of the selected independent variables on the dependent variable. The general multiple regression model would of the following form.

\[
y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + \ldots + b_n X_n + e_i
\]

Where;

- $Y$ = dependent variable
- $a$ = constant
- $b_1$ to $b_n$ = the partial regression co-efficients
- $X_1, X_2, \ldots, X_n$ = the independent variables
- $e_i$ = The stochastic disturbance or the random error.

The predictive power of multiple regression equation was evaluated with the help of the multiple correlation representing the proportion of the total variation explained by the independent variables taken together in the regression equation. The prediction power of the multiple regression equation was tested by using ‘F’ test.

Multiple regression analysis in the study on hand of the stress and the causative factors were analysed. Therefore, the stress factor was considered as dependent variable and the causative factors, otherwise known as stressors were considered as independent variables. The stressors like
physical problems, psychological problems, educational problems, family problems, economic problems, social problems, institutional problems, technological problems, personal problems, and environmental problems were considered as the independent variables. In the regression model, the magnitude of influence of the stressors on the stress was estimated. The multiple regression model of the following form was specified in the study.

\[ Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + b_{10} X_{10}. \]

Where: \( Y \) = the stress in scores, the dependent variable.
\( a \) = the constant the intercept
\( X_1 \) = Physical problems
\( X_2 \) = Psychological problems
\( X_3 \) = Educational problems
\( X_4 \) = Family problems
\( X_5 \) = Economic problems
\( X_6 \) = Social problems
\( X_7 \) = Institutional problems
\( X_8 \) = Technological problems
\( X_9 \) = Personal problems
\( X_{10} \) = Environmental problems
\( b_1 \) to \( b_{10} \) = the regression coefficients to be estimated by employing the Ordinary Least Square method.

The multiple regression analysis was carried out separately for the 220 rural sample and 220 urban sample. Another function was also derived for all the 440 samples put-together.

**b. Discriminant Analysis**

Discriminant Analysis (DA), a multivariate statistical technique was commonly used to build a predictive/descriptive model of group discrimination based on observed predictor variables and to classify each observation into one of the two groups. In DA, multiple quantitative attributes were used to discriminate single classification variable. The common objectives of DA are (i) to investigate the differences between groups (ii) to discriminate groups effectively; (iii) to identify important discriminating variables; (iv) to perform hypothesis testing on the differences between the expected groupings; and
(v) to classify new observations into pre-existing groups. Stepwise, canonical and discriminant function analyses are commonly used DA techniques. The general form of the discriminant function model for the study on hand was:

$$z_i = d_{i1}x_1 + d_{i2}x_2 + d_{i3}x_3 + d_{i4}x_4 + d_{i5}x_5 + d_{i6}x_6 + d_{i7}x_7 + d_{i8}x_8 + d_{i9}x_9 + d_{i10}x_{10}$$

Where:  
- $z_i$ – the score on discriminant function  
- $d_i$ – the weighing coefficients  
- $X_1$ = Physical problems  
- $X_2$ = Psychological problems  
- $X_3$ = Educational problems  
- $X_4$ = Family problems  
- $X_5$ = Economic problems  
- $X_6$ = Social problems  
- $X_7$ = Institutional problems  
- $X_8$ = Technological problems  
- $X_9$ = Personal problems  
- $X_{10}$ = Environmental problems

After having predicted the index scores for the two groups of respondents namely rural ($z_{ic}$) and urban ($z_{ip}$) the cut-off point was derived from the following formula:

$$C_{op} = \frac{Z_{ic} + Z_{ip}}{2}$$

Where:
- $C_{op}$ - the cut-off point  
- $z_{ic}$ – the predicted index score of discriminant function for the group of rural respondents and  
- $z_{ip}$ – the predicted index score of discriminant function for the group of urban respondents.

Based on the cut-off point value, the individual respondents were classified as members of one group or the other based on the value of the prediction variables.

The schematic representation of the methodology followed for the study is illustrated in Figure 6.
Total (N=440) Multi-stage stratified random sampling procedure

Socio – Economic Characteristics
Multiple Role of fisherwomen
Assessment of Stress level - DASS (Depression Anxiety Stress Scale – 42 Lovinbond and Lovinbond,1995) and BMI
Problems that created stress
Stress mitigation practices adopted by them
Training

PHASE-I:
Planning Training Programme
Sample Size : 40
- Rural N : 20
- Urban N: 20
Age group: 30-55 years

PHASE-II:
Implementing the Training Programme
No. of Days : 7 days
Twin hearts mediation for 3 months

PHASE-III:
Impact of the Training Programme
Assessment of
- Knowledge Level using Checklist
- Stress Level using DASS

Figure 6. Schematic representation of the methodology