Chapter III

MATERIALS AND METHODS

Science is a systematized body of knowledge. It is marked by careful and accurate classification of facts, discovery of scientific laws by creative imagination and self criticism to arrive at logical conclusions. The reliability and validity of the research findings depend mainly upon the methodological framework employed. Therefore, the present chapter has been planned to elaborate methodological procedure adopted and various analytical techniques employed in achieving the set objectives of the present study on “Socio-economic status and livelihood security of women” under the following sub-heads.

3.1 Selection of the Study Area

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   3.2.1 Selection of tea growing locations
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3.3 Data Collection
   3.3.1 Primary data
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3.4 Analytical Frame Work
   3.4.1 Tabular technique
   3.4.2 Regression analysis

3.1 Selection of the Study Area

The present study was carried out in tea growing areas of Kangra district of Himachal Pradesh (India) and Nuwara Eliya district of Sri Lanka, as both areas have almost similar type of
agro-climatic conditions viz; altitude (500 – 5500m amsl), temperature (5.7 – 33.1 °C) and rainfall (1100 – 3100 mm/annum) as a result of which, tea cultivation dominates the cropping pattern in higher ranges of both regions.

3.2 Sampling Design

Multi-stage random sampling technique was employed to select tea growing locations, villages and households.

3.2.1 Selection of tea growing locations

There are four tea growing areas of Kangra district (India), namely Palampur, Baijnath, Dharmasala and Kangra (Tea Directory of HP, 1997) and five in Nuwara Eliya district, namely Ambagamuwa, Udahekaheta, Kothmale, Nuwara Eliya and Walapane (Department of Census and Statistics, Sri Lanka. 1981). In the first stage of sampling, three locations were randomly selected from each selected district for the present investigation (Figs. 3.1 - 3.5).

3.2.2 Selection of villages

In the second stage, a complete list of all villages was prepared from each selected tea growing location and one village from each pocket was randomly selected to reflect different resource endowments, livelihood scenarios and socio-economic features, thus, making a total sample size of 6 villages. The selected villages from Kangra district were Tohri Da Behru, Mahlpat and Rajehr, while same number of selected villages from Nuwara Eliya district was Avenugala, Gasnagaldeniya and Yatimadura.

3.2.3 Selection of households

In the final stage, a complete list of all the households of the selected villages was prepared with consultation of members of Panchayat / Gramasewaka. Keeping the time and resource constraints in view, a manageable sample of 25 households from each selected village was randomly chosen, thus making a total sample of 150 households.

3.3 Data Collection

The present study was based on primary as well as secondary data at the household level and village level.
3.3.1 Primary data

Primary data relating to various parameters of socio-economic status, entrepreneurship and livelihood security were gathered from the female respondents of selected households through well designed and pre-tested schedules, by survey method for an agricultural year (2006-07).

The details of primary data pointers are given below:
- Demographic features (age, education, marital status)
- Assets (landholdings, productive assets, non-productive assets)
- Income pattern (occupation, farm income, off-farm income)
- Expenditure pattern (food, non-food expenditure)
- Consumption pattern (diet diversity, nutrient intake)
- Health status
- Quality of housing
- Social participation
- Components of entrepreneurial behaviour
- Indicators of livelihood outcomes
- Shocks & coping up strategies
- Problems & constraints

3.3.2 Secondary data

The secondary information was collected from various published and unpublished sources, different offices of Govt. (District Statistical Office, Block development office, Panchayat office, Gramasewaka office, District secretariat office, Govt. schools, primary health centers, Tea Small Holding Authority (TSHDA), Department of Agriculture, Department of Animal Husbandry) and NGO’s (women organizations, Aanganwadi, Balwadi, co-operatives, CARE- Sri Lanka, Centre for Women Research (CENWOR), Beredina). Further, information was collected through participatory approach and from key informants in the village.

The various components of secondary data collected are elaborated as under:
- Demographic information
- Historical information
- Infrastructural information
- Institutional & organizational structures
- Production & income generating activities

3.4 Analytical Frame Work

To meet out the set objectives of the present investigation, tabular and regression techniques were employed to analyse the data.

3.4.1 Tabular technique

The tabular technique was extensively employed to workout averages, ratios, percentages and indices for the data relating to various socio-economic features of sample households, women’s involvement in various activities, contribution of components of entrepreneurial behaviour of women, livelihood outcomes (food security, economic security, educational, health, habitat and social network security), shocks & coping up strategies and various socio-economic problems faced by them.

3.4.1.1 Construction of indices

The following indices relating to various pointers were computed as under:

Educational Disparity Index (EDI)

\[ EDI = \frac{F_{ed}}{M_{ed}} \]

Where;

\[ F_{ed} = \text{Per cent of literate females} \]
\[ M_{ed} = \text{Per cent of literate males} \]

If the \( EDI \) value = 1 ; no disparity
< 1 ; there is disparity

Decision Making Index (DECIND)

In order to arrive at a more clear idea of women’s involvement in decision making, a composite index was constructed assigning a higher weightage in case of women’s individual independent decision making (Meitei, 2004). In the present investigation, 10 areas of...
women involvement in decision making were considered under two broad categories such as economic related decisions (daily family expenses, personal needs, major finances/investments, ornaments, saving & borrowing) and social related decisions (children’s education, treatment for sick child, going to natal kin and joining with friends). Score 1 was assigned, if the respondent made the decision by herself, while 0.5 was assigned if she participates in making decision along with males (joint decision). If the respondent does not participate in making decisions, zero score was assigned. A composite index was constructed by summing all the values. The index ranges from 0 if the respondent does not participate in any decisions and 10 if she takes all the 10 decisions by herself. DECIND were classified in to three groups viz, low, medium and high with the help of cube-root cumulative frequency method of stratification (Singh and Manget, 1996) that has been explained as under:

$$L_i = y_{i-1} + \left( \frac{S_k - S_{i-1}}{L} \right) \left( y_i - y_{i-1} \right)$$

Where;

- $L$ = No. of strata
- $L_i$ = Upper limit of $i$th strata
- $y_{i-1}$ = Lower limit of the class in which $L_i$ lies
- $S_k$ = Cumulative total of $3\sqrt{f_i}$
- $3\sqrt{f_i}$ = Cube root of the frequency of the $i$th class in which $L_i$ lies
- $S_{i-1}$ = Cumulative cube root of the frequency of preceding class to the class to which $L_i$ lies
- $y_i$ = Upper limit of the class in which $L_i$ lies
- $y_i - y_{i-1}$ = Width of the class in which $L_i$ lies

**Mobility Index (MI)**

The mobility index was constructed based on the women’s responses whether she can go alone to the market, hospital, homes of friends/relatives, natal place and work in the distant places (Stash and Morgan, 1999 and Durrant and Sathar, 2000). If the respondents response “yes”, score 1 was assigned and otherwise zero. The aggregate index was
developed by summing all scores of the responses.

**Entrepreneurial Behaviour Index (EBI)**

Entrepreneurial behaviour index is an aggregate measure of eleven components. These components were measured with the help of different scales developed by Nandapurkar (1982) on achievement motivation, leadership ability, farm decision making, ability to co-ordinate farm activities, knowledge of farming, cosmopolitiness & innovativeness and Samantha (1977), Supe (1969) and Murali (1977) on management orientation, risk taking ability and self confidence, respectively. Utilization of available assistance was also measured with the help of scale developed considering available assistance in the study areas. The different scales were applied by giving different score values. To make it comparable, the scores were computed out of ten. The composite EBI was developed by aggregating all the scores of the above components.

**Livelihood Security Index (LSI)**

LSI is consisted of six livelihood outcomes and these were measured based on accessibility/availability, quality and status. To assess the different livelihood outcomes relevant indicators were selected from the standard menu indicators of CARE USA/Program Division/PHLS (Appendix - I). Each indicator was ranked on a five-point ordinal scale and these ranges were calibrated to the situation of the villages of Kangra district. Livelihood security Indices such as food, economic, health, education, habitat and social net-work security were computed by aggregating all the scores of the selected indicators.

**3.4.3 Regression analysis**

To identify key determinants of status and entrepreneurial behaviour of women, step-up regression analysis was employed using SPSS version 9.0. The status of women was studied under three categories, low, high (ranked based on cube root cumulative frequency method) and overall status for the pooled data. The functional form of the key determinants of women status was as under:

\[ Y_1 = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + B_5 X_5 + B_6 X_6 + B_7 X_7 + B_8 X_8 + B_9 X_9 + B_{10} X_{10} + B_{11} X_{11} + B_{12} X_{12} + B_{13} X_{13} + B_{14} X_{14} + B_{15} X_{15} + \mu_1 \]
Where,

\( Y_1 \) = Status of women (quantified with the help of scale developed).

\( X_1 = \) Caste

1, if a woman belongs to upper caste
0, if she is from lower caste

\( X_2 = \) Age (in years)

\( X_3 = \) Marital status

1, if the woman is married and 0, otherwise

\( X_4 = \) Education level of women

0, if the woman was illiterate
1, if she had studied up to primary
2, if she had studied up to middle
3, if she had studied up to matric
4, if she had studied up to secondary
5, if she had studied up to Graduate & Postgraduate level

\( X_5 = \) Family size (No.)

\( X_6 = \) Type of family

1, if joint family
0, if Nuclear family

\( X_7 = \) Husband’s education level

0, if the husband was illiterate
1, if husband had studied up to primary
2, if husband had studied up to middle
3, if husband had studied up to matric
4, if husband had studied up to secondary
5, if husband had studied up to Graduate & Postgraduate level

\( X_8 = \) Social participation

1, if a woman was member of any organization

0, if she was not member

\( X_9 = \) Inter-spouse age difference (in years)

\( X_{10} = \) Marriage duration (in yrs)

\( X_{11} = \) Occupation

1, if woman was employed

0, if she was not employed

\( X_{12} = \) Land ownership

1, if a woman was owner of land

0, if she had no land ownership

\( X_{13} = \) Women's income (Rs./annum)

\( X_{14} = \) Per capita income (Rs./annum)

\( X_{15} = \) Women’s saving (Rs./annum)

\( B_0 = \) Intercept term

\( B_1, \ldots, B_{15} = \) Regression coefficients

\( \mu_i = \) Random error term

The functional form of the key determinants of entrepreneurial behaviour of women was given as under;

\[ Y_2 = B_0 + B_1 X_1 + B_2 X_2 + B_4 X_4 + B_8 X_8 + B_{16} X_{16} + B_{17} X_{17} + B_{18} X_{18} + B_{19} X_{19} + \]

\[ B_{20} X_{20} + B_{21} X_{21} + B_{22} X_{22} + B_{23} X_{23} + B_{24} X_{24} + \mu_2 \]

Where,

\( Y_2 = \) Entrepreneurial behaviour index

\( X_1 = \) Caste
1, if a belongs to upper caste
0, if the woman is from lower caste

\( X_2 = \text{Age (in yrs)} \)

\( X_4 = \text{Education level of women} \)

0, if the woman was illiterate
1, if she had studied up to primary
2, if she had studied up to middle
3, if she had studied up to matric
4, if she had studied up to secondary
5, if she had studied up to Graduate & Postgraduate level

\( X_8 = \text{Social participation} \)

1, if a woman was member of any organization
0, if she was not member

\( X_{16} = \text{Land holdings (in acres)} \)

\( X_{17} = \text{Experience in farming (in yrs)} \)

\( X_{18} = \text{Income from farming (Rs./annum)} \)

\( X_{19} = \text{Total household’s income (Rs/annum)} \)

\( X_{20} = \text{Marketing facilities} \)

3, if the market facility is available <5 km distance (local)
2, if the market facility is available <5 - 20 km distance (near)
1, if the market facility is available >20 km (away)

\( X_{21} = \text{Economic motivation (schedule developed by Supe, 1969)} \)

\( X_{22} = \text{Scientific orientation (schedule developed by Supe, 1969)} \)

\( X_{23} = \text{Training received (in days)} \)

\( X_{24} = \text{Information source utilization (schedule developed)} \)
\[ B_0 = \text{Intercept term} \]
\[ B_1 \ldots \text{Regression coefficients} \]
\[ \mu_2 = \text{Random error term} \]

It is well known fact that \( R^2 \) normally increases with the increases in independent variables. To neutralize these effects, adjusted coefficient of multiple determination \( \bar{R}^2 \) was calculated as follows:

\[
\bar{R}^2 = 1 - \left( 1 - R^2 \right) \left( \frac{N - 1}{N - K} \right)
\]

The significance of \( \bar{R}^2 \) was tested with the help of F test as under:

\[
F = \frac{\bar{R}^2}{1 - \bar{R}^2} \frac{N - K}{(N - K)K - 1}
\]

Where,

\( \bar{R}^2 \) is the adjusted coefficient of multiple determination.
\( N \) is the sample size and
\( K \) is the total number of parameters estimated from the sample observations.

The calculated regression coefficients were tested for significance by employing t test.

\[
t_{\text{cal}} = \frac{\text{Regression Coefficient}}{\text{SE}} \sim t(N - K)
\]

Where,

\( t_{\text{cal}} \) = calculated t value
\( t(N - K) \) = table t value for degree of freedom \((N - K)\) at given level of significance.

\( \text{SE} \) = Standard Error of regression

Wherever the stratification of data was needed, the cube root cumulative frequency
method was applied.

**Pearson’s correlation coefficients**

To examine impact of women’s income on household food security, Pearson’s correlation coefficients were calculated as follow.

\[ r = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 \sum y_i^2}} \]

Where, 
\[ x_i = (X_i - \overline{X}) \]
\[ y_i = (Y_i - \overline{Y}) \]
\[ \overline{X} = \frac{\sum X_i}{N} \]
\[ \overline{Y} = \frac{\sum Y_i}{N} \]

Where,

\( r \) is the correlation coefficient.

\( X_i \) and \( Y_i \) are the Calorie Adequacy Ratio (women calorie adequacy ratio, household calorie adequacy ratio and children’s calorie adequacy ratio) and women’s income, respectively. \( N \) is the number of observations derived from the sample.

The calculated correlation coefficients were tested for significance by employing t test. The value of t statistic is estimated from the sample correlation coefficient \( r \), by the expression

\[ t^* = \frac{r \sqrt{N - 2}}{\sqrt{1 - r^2}} \]

Where,

\( t^* \) = calculated t value

\( N \) = Number of observations