METHODOLOGY

Food security in terms of national security and household security are the most debated subjects. Since it has relevance to the national development on one side and health and well being individuals on the other. Therefore, the term food security has been defined and redefined frequently. According to Gillespie and Haddad (2001), food-secured households are those with consistent access throughout the year to adequate food for active healthy living [8-9].

Literature provides enormous data about food security at various levels; however, there appears to be a great lacuna in the data. Infact food security is the widest aspect of nutritional studies applicable at global level, national level and individual level. India comprises of a diverse population with varying food cultures, although volumes of literature presents the food and cultural information, limited literature is available about household food security from the coastal regions of Karnataka. Therefore, the study was taken up to assess the family food security and also to examine the gender based differences in food security. The details of methodologies included in the present study are given under the following heads.

1. Selection of the area
2. Selection of the population
3. Development of tools
4. Description of tools used in the study
5. Conducting the study
6. Statistical analysis

1. Selection of the study area

Two taluks from South Canara district were chosen for the study. The reason for choosing South Canara area is because of two reasons:

1. Nutritional studies are rarely done, data about food habits, eating behaviour and other nutritional aspects are highly limited.
2. Food behaviours in this region are markedly different from that of the other regions of Karnataka. Majority are fish eating population, use of coconut and its oil predominates. This region is also bestowed with variety of fruits and
vegetables which are rarely available in other regions. Other than this, eating habits vary enormously.

South Canara district has four taluks, among them Karkala and Moodbidri taluks were selected for the study. They are the urban regions and known for their good educational institutions.

2. Sampling procedures

Cluster sampling was adopted for the purpose. Two urban regions i.e., Karkala and Moodbidri taluks were chosen as major clusters. Each taluk was divided into 5 clusters being north, south, east, west and centre. 70 households were chosen from each cluster for the study. Hence from each taluk a total of 350 household formed the study population.

Families were selected by house to house contact; those families who extended full cooperation to provide the information completely were included for the study. A total of 700 families from the two regions formed to total population of the study.

3. Development of tools

The required information was elicited from the family using structured and unstructured questionnaires. The various questionnaires used are as follows.

a. General information about the family
b. Assessment for general health condition
c. Food related activities of the family
d. Eating behaviour of the family- FFQ
e. Food security module- USDA (2002)
f. Quality of Life- CDC HR QOL-14
g. Nutritional assessment
h. Physical activity schedule with a break up of 15 mins-WHO (Activity pattern)
i. Dietary intake by dairy technique
j. Biochemical assessment for Hb
4. Description of the tools
   a. The questionnaire was developed to elicit general information about family. This included information about the head of the family or stake holder and the bread earner. Religion, caste, family type, family composition, education and occupation of the family members were included. Details about recreational activities, other habits smoking, alcohol consumption, betel leaf chewing was also elicited. Questions related to practise of availing medications were included.
   b. Queries relating to general health condition of the adult male and female couples (husband and wife) was elicited
   c. Details regarding food procurement including person responsible for purchase, process of planning to purchase, planning for the meal and cooking activities. Factors that influence food related activities were also elicited.
   d. This included queries related to type of diet practiced, observing fasts, skipping meals, pattern of family meal, eating outside home, attending parties, munching habits etc., A questionnaire for frequency of food consumption was included to obtain details about frequency of consuming different foods during 15 days duration.
   e. Food security Module: This is a structured questionnaire adopted from USDA (2002). This is a model for global application for adults. It is a simple questionnaire covering 5 domains for food security. This elicited information about food available at home and the experience of food shortages within one year.

   The schedule helped to identify the groups with 3 different states of food security, including state of severe food insecurity

   1. Food secured
   2. Food insecure without hunger
   3. Food insecure with hunger
   f. Health related Quality of Life (QOL) measures: CDC HR QOL-14 was adopted for all 700 adult male and female couples. It has 14 questions; it identified mental health, physical health and overall QOL. The questionnaire has 3 major sections:
1. Healthy days core module
2. Activity limitation module
3. Health days symptoms module

g. **Nutritional assessment:**

1. **Dietary intake data:** was obtained by two techniques.
   a. **Dietary intake:** Diet diary was used to elicit food intake data from the selected couples. A 7 days diet diary was obtained from 70 selected families. In each family female head was explained about the importance of assessing dietary intake. They were trained to record food intake data of individual man and woman through demonstrating use of standard cups, tumblers and spoons for serving food and drinks. During the recording days they were contacted through telephone every alternate day to guide for correct entries. Nutrient intake from dietary data was computed using a ready recknor for cooked foods standardized for the purpose [293].
   b. **Inventory:** For family food intake data total quantity of food and various ingredients used for cooking each meal was recorded in terms of cups and numbers. The number of members shared the food was also recorded. This was also recorded for seven days. The food data was converted to selected ‘nutrients’ using Nutritive value of Indian food [294], per caput intake was calculated using consumption units as described by ICMR [295]. Total consumption of each nutrient by the family members to obtain ‘Per caput intake’. This was compared to the ‘mean nutrient requirements’ for the respective family. This was computed using RDA of ICMR, according to family composition and calculated mean. This has been presented as RDA-derived in tables.

   The data was used to obtain two different information i.e., Family intake as ‘Per capita intake’ and individual intakes of adult man and woman (husband and wife couple). Consumption units as described by ICMR was used to derive per capita nutrient intake and was compared to RDA for Indian’s [296]. Individual intake of nutrients by male and female couples was computed and used for the study.
CONSUMPTION UNITS (ICMR)

<table>
<thead>
<tr>
<th>Category</th>
<th>Consumption Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult male (Sedentary worker)</td>
<td>1.0</td>
</tr>
<tr>
<td>Adult male (Moderate worker)</td>
<td>1.2</td>
</tr>
<tr>
<td>Adult male (Heavy worker)</td>
<td>1.6</td>
</tr>
<tr>
<td>Adult female (Sedentary worker)</td>
<td>0.8</td>
</tr>
<tr>
<td>Adult female (Moderate worker)</td>
<td>0.9</td>
</tr>
<tr>
<td>Adult female (Heavy worker)</td>
<td>1.2</td>
</tr>
<tr>
<td>Adolescents 12-20 years</td>
<td>1.0</td>
</tr>
<tr>
<td>Children 9-12 years</td>
<td>0.8</td>
</tr>
<tr>
<td>7-9</td>
<td>0.7</td>
</tr>
<tr>
<td>5-7</td>
<td>0.6</td>
</tr>
<tr>
<td>3-5</td>
<td>0.5</td>
</tr>
<tr>
<td>1-3</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Ref: ICMR [295]

2. Anthropometric assessment: Adult male and female couples of the selected families from the cross sectional population (700 families) were measured for body weight, height, MUAC, waist and hip circumferences. The techniques adopted were according to Jelliffe [297].

Height measurement: Linear height of adult man and the adult woman (husband and wife couples) were measured in cms using a portable height measuring rod with an accuracy of 0.1 cms

Weight measurement: A battery operated digital balance (Glan electronic personal scale) was used to record the weight of the subjects. The balance was checked for its accuracy each time before use. Details of measurement were according to WHO.

MUAC measurement: A flexible fibre glass tape having a scale with 10 divisions per centimetre was used, the measurement was done on the left hand at the centre point marked after measuring the length between acromion and Olecranon.

HIP circumference: Hip circumference was measured as the maximum circumference over the buttocks.
Waist circumference: Waist circumference was measured at the lowest point below the lower rib margin. The tape was wrapped around the waist/hip region and held in a horizontal position. Care was taken to hold the tape so that only one finger could pass between the tape and the subject’s body, the tape was crossed over to coincide with the zero line and held firmly and the measurements were recorded.

Indices used: BMI and WHR were used to assess obesity. The empherical formula for BMI was used.

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

Cut off level indicating weight status used for the South East Asians population is as follows [298-299]

- Chronic Energy Deficient- <18.5
- Normal 18.5-22.9
- Overweight 23.0-24.9
- Obesity >25.0

WHR was calculated by

\[ \text{WHR} = \frac{\text{Waist circumference (cms)}}{\text{Hip circumference (cms)}} \]

Cut off level indicative of obesity were as follows:

- Men >0.9 and women >0.85 [300].

3. Haemoglobin assessment: Hb was estimated from peripheral blood obtained by finger prick method. The blood was spotted on Watman No.1 filter paper eluted and measured according to cyanmethemoglobin method. This was done on 70 couples.

h. Physical Activity records:

The activity records consisted of log-in of a day’s activity of the 70 selected couples during the study period. Each man and woman was instructed to state the nature of activities performed and the time spent in each activity. The data from this was converted into energy expenditure by estimating and multiplying the time period in which the subject was engaged in activities by energy cost of each activity in terms
of MET (Metabolic Energy Thermogenesis) based on BMR and summing the total energy expended for a day [301]. Hence, total energy expenditure from the activity records was expressed as mean total energy expenditure of one day.

4. Conducting the study:

The present investigation is a semi longitudinal study and conducted into two assessment period.

i. Cross sectional study

ii. In-depth study -Semi longitudinal

i. Cross sectional study:

**General information**: 700 families who cooperated to provide detailed information were included in the study (350 families from each taluk).

A consent letter was obtained from the head of the family to show their willingness and interest to be in the study. Assurance was given to the participants for the confidentiality of the subjective data. The female head of the family was always the respondent. All the schedules were interview schedules and therefore the information was elicited and the schedules were completed on the first or second visit. Each schedule was read and necessary explanation was given before attempting the entries so as to help them to provide correct information.

**HEC approval** - The study was presented before the HEC, University of Mysore, Mysore. The approval was obtained before commencement of the data collection (copy enclosed in Appendix D).

**Anthropometric assessment**: Ht, Wt, MUAC, waist and hip circumference were obtain from male and female couples from all the families.

The adult male and female couples of 700 families were assessed for QOL. All families were assessed for food security.

ii. In-depth study -Semi longitudinal:

10% of the total population were chosen for an in-depth study. Selection of families for in-depth study was purposive sampling. Those families who cooperated to
participate for the in-depth assessment to maintain family food diary were only considered for this study. 35 families from each taluk formed the population for in-depth study.

Since one of our objectives was to project the gender based differences. We proposed to include the male and female couples (Husband and wife) for in-depth study.

**Assessments included**

1. Nutrient intake: Per capita intake of selected nutrients like Energy, proteins, fats, calcium, iron, β carotene and retinol of the families was obtained. Individual intake of the male and female couples was also collected through diary technique.

2. Anthropometric assessment: Ht, Wt, MUAC, waist and hip circumference were included for the assessment for male and female couples of the family.

3. Activity pattern: One day activity recall was obtained from the male and female couples of the family.

4. Bio chemical assessment: Haemoglobin was estimated from 70 male and female couples.

**Scoring patterns developed for the study:**

1. **Socio Economic Status (SES) Scale:** SES scale was developed for the study population based on education and occupation status of the head of the family. The classification of education and occupation into various categories was adopted from Desai et al (2010) [302]. Each category under education as well as occupation was designated a number according to its hierarchy. The lowest mean score therefore obtained was 3 and the highest was 18. These scores were equally divided into 3 i.e., < 5, 6-11 and 12-18. Those families falling into total score of less than 5 were designated as low SES while those with score between 6-11 were designated as middle SES and greater than 12 were high SES. This pattern of division of SES was used for the present study. (Details of the classification of education and occupation are given in Appendix E).
2. **Pattern of availing medical assistance:** It is a known fact that people use parallel medicine along with medical treatment. Hence it was proposed to investigate the extent of such supportive medicine used by the study population. It was calculated as given below

\[
\text{Supportive medicine} = \frac{\text{Sum of respondents using more than one mode of treatment of medicines}}{\text{Total no. of study population}}
\]

3. **Scoring for food security:** In the questionnaire each statement has 4 responses varying from ‘Often true’, ‘Sometimes true’, ‘Never true’ and ‘Don’t know’. These responses were designated a score starting from 0 for ‘Don’t know’ to 1 for ‘Often true’ and 3 for ‘Never true’. Therefore, a total score of 8-20 was obtained, wherein highest score indicated ‘Food security’ and low scores ‘Food insecurity’. The following classifications were thereby used for the study population to classify into

- Food secured (16-20)
- Food insecure without hunger (12-15) and
- Food insecure with hunger (8-11)

4. **Aspects of QOL Measurement:** The QOL questionnaire elicits primarily 2 aspects of health i.e., physical and mental health experienced in the past 30 days. The statement included under each category was found to be indicative of extent of ill health. Therefore it was proposed to compute healthy days.

   **A. Population Healthy days:** Total population healthy days were calculated according to the following steps

   1. No. of respondents in terms of percent
   2. Total population days = No. of respondents * 30 days
   3. No. of respondents mentioned pain/depression/tension/sleep/energetic in terms of percent
   4. Mean no. of days mentioned for pain/depression/tension/sleep/energetic by number of respondents
   5. No. of respondents who had no pain/depression/tension/sleep/energetic in terms of percent
   6. Healthy days:
Total no. of healthy days = Total no. of population days minus total no. of sick days

Equivalent healthy days of population = \( \frac{\text{Total no. of healthy days}}{\text{Total no. of population days}} \)

**B. Cut off for severity of sickness:** The extent of sickness was measured in terms of days affected

- Mildly affected (0-10)
- Moderately affected (11-20) and
- Severely affected (>20)

**Cigarette smoking index (Standard):** Cut off level indicative of severity of cigarette smoking was used according to Nicotine and Tobacco Research [303]. Cut off levels are as follows:

- Light smokers 0-9 cigarette
- Moderate smokers 10-19 cigarette
- Heavy smokers >20 cigarette

**6. Data Management and Statistical analysis:**

The individual data obtained were made into data sheet for easy access of information. It was tabulated in Excel 2007 version. Descriptive analysis was employed to all the data to describe the characteristics of the population. Mean, Standard Deviation, Percentage were calculated. The means were compared using student ‘t’ test, paired ‘t’ test and Correlation was performed among the variables to indicate the dependence on one another (Pearson’s correlation tests). Chi Square was applied to describe the relationship and significance among the variables of the study.

**Limitation of the study: Major**

- Number of families included for in-depth study-semi longitudinal was small.
- Gender influence was compared for male and female couples (family head) only.