

APPENDIX I



Avinashilingam

Institute for Home Science and Higher Education for Women

University

(Estd. u/s 3 of UGC Act 1956)

Re-accredited with 'A' Grade by NAAC

Coimbatore - 641 043, Tamil Nadu, India

Schedule to elicit information regarding personal and social characteristics of the Households

District:

Taluk:
Block:

1. Name of the Family Head :
2. Address :

3. Contact No.
4. Age :
5. Sex :
6. Marital status :
7. Religion :
i) Hindu ii) Christian iii) Muslim
8. Caste :
i) Forward
ii) Backward
iii) Most backward
iv) Schedule caste
v) Schedule tribe
9. Type of Family :i) Nuclear Family ii) Joint Family

10. Family Composition :

Details regarding family members

| Sl.No. | Name of the family member | Relationship | Age | Educational Status | Occupation |
|--------|---------------------------|--------------|-----|--------------------|------------|
| | | | | | |

11. Total Family Income :

12. Sources of Family Income :

| Sl.No. | Source | Income |
|--------|---------------------|--------|
| | | |
| | Total Income | |

13. Expenditure pattern for the following items

| S. No. | Items | Amount spent | |
|--------|--|--------------|----|
| | | Rs | Ps |
| 1. | Food | | |
| 2. | Clothing | | |
| 3. | Housing (Rent, Electricity, Telephone / mobile, Water, Tax, etc) | | |
| 4. | Education | | |
| 5. | Medicine | | |
| 6. | Transportation | | |
| 7. | Savings | | |
| 8. | Festivals / Gifts | | |
| 9. | Recreation | | |
| 10. | Any other (Specify) | | |

Schedule to elicit information regarding Frequency of Food consumption by the Households

1. Eating Habit of the household :

i) Veg ii) Non- veg iii) Ovo- veg

2. Frequency of Food consumption of the following food items

| S. No. | Food items | Mode of Storage | Daily | Weekly thrice | Weekly Twice | Once in a week | Fortnightly | Occasionally | Monthly Once | Never |
|------------------|-----------------------|-----------------|-------|---------------|--------------|----------------|-------------|--------------|--------------|-------|
| 1. | Cereals | | | | | | | | | |
| | Raw rice | | | | | | | | | |
| | Parboiled rice | | | | | | | | | |
| | Wheat (Flour) | | | | | | | | | |
| | Maida | | | | | | | | | |
| | Jowar | | | | | | | | | |
| | Bajra | | | | | | | | | |
| | Maize | | | | | | | | | |
| | Ragi | | | | | | | | | |
| | Samai | | | | | | | | | |
| | Varagu | | | | | | | | | |
| | Oats | | | | | | | | | |
| | Rice flakes | | | | | | | | | |
| | Puffed rice | | | | | | | | | |
| | Semolina / Vermicelli | | | | | | | | | |
| Others (Specify) | | | | | | | | | | |
| 2. | Pulses | | | | | | | | | |
| | Red gram dhal | | | | | | | | | |
| | Black gram dhal | | | | | | | | | |
| | Soyabean | | | | | | | | | |
| | Bengal gram dhal | | | | | | | | | |
| | Bengal gram (Whole) | | | | | | | | | |
| | Roasted Bengal gram | | | | | | | | | |
| | Green gram dhal | | | | | | | | | |

| | | | | | | | | | | | |
|-----------|-------------------------------|--|--|--|--|--|--|--|--|--|--|
| | Green gram (Whole) | | | | | | | | | | |
| | Horse gram (Whole) | | | | | | | | | | |
| | Green peas | | | | | | | | | | |
| | Cow pea | | | | | | | | | | |
| | Rajmah | | | | | | | | | | |
| | Others (specify) | | | | | | | | | | |
| 3. | Roots and tubers | | | | | | | | | | |
| | Potato | | | | | | | | | | |
| | Carrot | | | | | | | | | | |
| | Beetroot | | | | | | | | | | |
| | Onion (big) | | | | | | | | | | |
| | Onion (small) | | | | | | | | | | |
| | Radish (Pink / White) | | | | | | | | | | |
| | Turnip | | | | | | | | | | |
| | Tapioca | | | | | | | | | | |
| | Mango ginger | | | | | | | | | | |
| | Sweet potato | | | | | | | | | | |
| | Yam | | | | | | | | | | |
| | Colocasia | | | | | | | | | | |
| | Others (Specify) | | | | | | | | | | |
| 4. | Green leafy vegetables | | | | | | | | | | |
| | Agathi | | | | | | | | | | |
| | Cabbage | | | | | | | | | | |
| | Cauliflower | | | | | | | | | | |
| | Amaranthus | | | | | | | | | | |
| | Celery | | | | | | | | | | |
| | Chekkurmanis | | | | | | | | | | |
| | Coriander leaves | | | | | | | | | | |
| | Mint | | | | | | | | | | |
| | Paruppukeerai | | | | | | | | | | |
| | Ponnangannikeerai | | | | | | | | | | |
| | Curry leaves | | | | | | | | | | |
| | Spinach | | | | | | | | | | |
| | Fenugreek leaves | | | | | | | | | | |
| | Drumstick leaves | | | | | | | | | | |

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|------------------|--------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | Others (Specify) | | | | | | | | | | | | | | | | | | | |
| 5 | Other vegetables | | | | | | | | | | | | | | | | | | | |
| | Ash gourd | | | | | | | | | | | | | | | | | | | |
| | Broad beans | | | | | | | | | | | | | | | | | | | |
| | Cluster beans | | | | | | | | | | | | | | | | | | | |
| | Colocasia stem | | | | | | | | | | | | | | | | | | | |
| | Brinjal | | | | | | | | | | | | | | | | | | | |
| | Kovai | | | | | | | | | | | | | | | | | | | |
| | Bitter gourd | | | | | | | | | | | | | | | | | | | |
| | Beans | | | | | | | | | | | | | | | | | | | |
| | Plantain – raw / stem / flower | | | | | | | | | | | | | | | | | | | |
| | Bottle gourd | | | | | | | | | | | | | | | | | | | |
| | Cucumber | | | | | | | | | | | | | | | | | | | |
| | Snake gourd | | | | | | | | | | | | | | | | | | | |
| | Pumpkin | | | | | | | | | | | | | | | | | | | |
| | Ladies finger | | | | | | | | | | | | | | | | | | | |
| | Tomato | | | | | | | | | | | | | | | | | | | |
| Others (Specify) | | | | | | | | | | | | | | | | | | | | |
| 6 | Fruits | | | | | | | | | | | | | | | | | | | |
| | Amla | | | | | | | | | | | | | | | | | | | |
| | Cashew fruit | | | | | | | | | | | | | | | | | | | |
| | Dates | | | | | | | | | | | | | | | | | | | |
| | Jack fruit | | | | | | | | | | | | | | | | | | | |
| | Plantain | | | | | | | | | | | | | | | | | | | |
| | Lemon | | | | | | | | | | | | | | | | | | | |
| | Seethaphal | | | | | | | | | | | | | | | | | | | |
| | Pine apple | | | | | | | | | | | | | | | | | | | |
| | Passion fruit | | | | | | | | | | | | | | | | | | | |
| | Musk melon | | | | | | | | | | | | | | | | | | | |
| | Banana | | | | | | | | | | | | | | | | | | | |
| | Orange | | | | | | | | | | | | | | | | | | | |
| | Grapes | | | | | | | | | | | | | | | | | | | |
| | Apple | | | | | | | | | | | | | | | | | | | |
| | Guava | | | | | | | | | | | | | | | | | | | |
| Papaya | | | | | | | | | | | | | | | | | | | | |
| Others (Specify) | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | |
|------------------|----------------------------------|--|--|--|--|--|--|--|--|--|
| 7 | Nuts and Oils | | | | | | | | | |
| | Gingelly oil | | | | | | | | | |
| | Groundnut | | | | | | | | | |
| | Coconut | | | | | | | | | |
| | Cashew nut | | | | | | | | | |
| | Groundnut oil | | | | | | | | | |
| | Coconut oil | | | | | | | | | |
| | Vanaspathy | | | | | | | | | |
| | Butter | | | | | | | | | |
| | Ghee (Cow / Buffalo) | | | | | | | | | |
| | Palmolein | | | | | | | | | |
| Others (Specify) | | | | | | | | | | |
| 8 | Fleshy foods | | | | | | | | | |
| | Mutton | | | | | | | | | |
| | Beef | | | | | | | | | |
| | Pork | | | | | | | | | |
| | Duck | | | | | | | | | |
| | Chicken | | | | | | | | | |
| | Egg (Hen / Duck) | | | | | | | | | |
| | Fish (fresh) | | | | | | | | | |
| | Fish (dried) | | | | | | | | | |
| | Others (specify) | | | | | | | | | |
| 9 | Milk and milk products | | | | | | | | | |
| | Milk (Cow / ass/ buffalo / goat) | | | | | | | | | |
| | Curd | | | | | | | | | |
| | Butter milk | | | | | | | | | |
| | Skimmed milk | | | | | | | | | |
| | Whole milk powder | | | | | | | | | |
| | Skimmed milk powder | | | | | | | | | |
| | Others (specify) | | | | | | | | | |
| 10 | Sugar and Jaggery | | | | | | | | | |
| | Sugar | | | | | | | | | |
| | Honey | | | | | | | | | |
| | Jaggery | | | | | | | | | |
| | Palm jaggery | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|---------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 11 | Beverages | | | | | | | | | | | | | | | | | | |
| | Tea | | | | | | | | | | | | | | | | | | |
| | Coffee | | | | | | | | | | | | | | | | | | |
| | Carbonated drinks (Cocacola, Pepsi, Mirinda, 7-up, Appy Fizz, Rasna) | | | | | | | | | | | | | | | | | | |
| | Others (specify) | | | | | | | | | | | | | | | | | | |
| 12 | Health Drinks (Specify) | | | | | | | | | | | | | | | | | | |
| | Horlicks | | | | | | | | | | | | | | | | | | |
| | Complan | | | | | | | | | | | | | | | | | | |
| | Boost | | | | | | | | | | | | | | | | | | |
| | Bournvita | | | | | | | | | | | | | | | | | | |
| | Viva | | | | | | | | | | | | | | | | | | |
| 13 | Bakery Foods | | | | | | | | | | | | | | | | | | |
| | Biscuits | | | | | | | | | | | | | | | | | | |
| | Bread | | | | | | | | | | | | | | | | | | |
| | Cookies | | | | | | | | | | | | | | | | | | |
| | Cakes | | | | | | | | | | | | | | | | | | |
| | Ladoo | | | | | | | | | | | | | | | | | | |
| | SoanPappadi | | | | | | | | | | | | | | | | | | |
| | Jilebi | | | | | | | | | | | | | | | | | | |
| | Myorepak | | | | | | | | | | | | | | | | | | |
| | Gulabjamun | | | | | | | | | | | | | | | | | | |
| | Puffs (Veg, Egg, Chicken, Mutton, Beef) | | | | | | | | | | | | | | | | | | |
| | Pizza | | | | | | | | | | | | | | | | | | |
| | Burger | | | | | | | | | | | | | | | | | | |
| | Instant Noodles | | | | | | | | | | | | | | | | | | |
| | Pastry | | | | | | | | | | | | | | | | | | |
| | Cutlets (Veg, chicken, mutton, fish) | | | | | | | | | | | | | | | | | | |
| Vada items | | | | | | | | | | | | | | | | | | | |
| Murukku items | | | | | | | | | | | | | | | | | | | |
| Any other (Specify) | | | | | | | | | | | | | | | | | | | |
| 14 | Preserved Foods | | | | | | | | | | | | | | | | | | |
| | Squash | | | | | | | | | | | | | | | | | | |
| | Jams | | | | | | | | | | | | | | | | | | |

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|------------|---|--|--|--|--|--|--|--|--|--|
| | Pickles | | | | | | | | | |
| | Papad | | | | | | | | | |
| | Any other (Specify) | | | | | | | | | |
| 15 | Algal / Fungal foods | | | | | | | | | |
| | Mushrooms | | | | | | | | | |
| | Seaweeds | | | | | | | | | |
| | Any other (Specify) | | | | | | | | | |
| 16. | Traditional diets Prepared in your home like Mundirikothu , cheedaetc | | | | | | | | | |

3. What are the Cooking practices followed in the home for the following Food items

| S. No. | Food items | Boiling | Pressure cooking | Steaming | Roasting | DeepFrying | ShallowFrying | Cooking with lid | Cooking without lid | Baking | Other(Specify) |
|---------------|-----------------------|----------------|-------------------------|-----------------|-----------------|-------------------|----------------------|-------------------------|----------------------------|---------------|-----------------------|
| 1. | Cereals | | | | | | | | | | |
| | Rice | | | | | | | | | | |
| | Wheat | | | | | | | | | | |
| | Jowar | | | | | | | | | | |
| | Bajra | | | | | | | | | | |
| | Maize | | | | | | | | | | |
| | Ragi | | | | | | | | | | |
| | Samai | | | | | | | | | | |
| | Varagu | | | | | | | | | | |
| | Oats | | | | | | | | | | |
| | Rice flakes | | | | | | | | | | |
| | Puffed rice | | | | | | | | | | |
| | Semolina / Vermicelli | | | | | | | | | | |
| 2. | Pulses | | | | | | | | | | |
| | Red gram dhal | | | | | | | | | | |
| | Black gram dhal | | | | | | | | | | |
| | Soyabean | | | | | | | | | | |
| | Bengal gram dhal | | | | | | | | | | |

| | | | | | | | | | | | |
|--------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Colocasia stem | | | | | | | | | | | |
| Brinjal | | | | | | | | | | | |
| Kovai | | | | | | | | | | | |
| Bitter gourd | | | | | | | | | | | |
| Beans | | | | | | | | | | | |
| Plantain – raw / stem / flower | | | | | | | | | | | |
| Bottle gourd | | | | | | | | | | | |
| Cucumber | | | | | | | | | | | |
| Snake gourd | | | | | | | | | | | |
| Pumpkin | | | | | | | | | | | |
| Ladies finger | | | | | | | | | | | |
| Tomato | | | | | | | | | | | |

4. What are the different processing methods practiced in the home for the following Food items

| S. No. | Food items | Soaking | Malting | Roasting | Powdering |
|--------|---------------------|---------|---------|----------|-----------|
| | Cereals | | | | |
| 1. | Jowar | | | | |
| 2. | Bajra | | | | |
| 3. | Maize | | | | |
| 4. | Ragi | | | | |
| 5. | Samai | | | | |
| 6. | Varagu | | | | |
| | Pulses | | | | |
| 1. | Soyabean | | | | |
| 2. | Bengal gram (Whole) | | | | |
| 3. | Green gram (Whole) | | | | |
| 4. | Horse gram (Whole) | | | | |
| 5. | Green peas | | | | |
| 6. | Cow pea | | | | |
| 7. | Rajmah | | | | |

5. Do you have the habit of skipping meals? If yes which meal?

6. Do you have the habit of eating outside? If yes which meal?

7. Do you have the habit of consuming fast foods? If yes what type?

8. Type of vessels used for cooking foods

9. Do you cook in iron vessels? If yes what are the foods cooked in iron vessels?

10. Do you have the habit of consuming left over foods kept in the fridge? If yes, what are the foods you use and for how many days you will use it?

11. What are the special foods given in diseased conditions?

| Diseases | Foods consumed | Reasons for consuming | Foods avoided | Reasons for avoiding |
|----------------|----------------|-----------------------|---------------|----------------------|
| Fever | | | | |
| Cold and cough | | | | |
| Diarrhoea | | | | |
| | | | | |
| | | | | |

12. What are the festivals celebrated in your locality?

13. What are the foods prepared for each festival?

| Festival | Foods prepared |
|----------|----------------|
| | |
| | |
| | |
| | |
| | |
| | |

14. What are the foods prepared and food avoided during fasting / vritha ?

| Fasting | Foods prepared | Foods avoided |
|---|-----------------------|----------------------|
| (Eg:- Shashti / Ramadhan/ Christmas etc) | | |
| | | |
| | | |
| | | |
| | | |
| | | |

15. What are foods consumed and foods avoided in the special stages like the following?

| Stage | Foods consumed | Foods avoided |
|--|-----------------------|----------------------|
| Weaning (Small children 6 months) | | |
| Childhood | | |
| Adolescence | | |
| Pregnancy | | |
| Lactation | | |
| Old age | | |

16. What are foods prepared and foods avoided during the following occasions like?

| Occasions | Foods prepared | Foods avoided |
|----------------------------|-----------------------|----------------------|
| Birthday | | |
| Wedding day | | |
| Weekends | | |
| Any other (Specify) | | |

17. Do any of the family members in your home suffer from the following life style diseases?

- a) Diabetics
- b) Obesity / Over weight
- c) CVD
- d) Cancer
- e) Hypertension
- f) Any other (Specify)

18. Method of preparation of each meal in the home for a single day?

| Meal | Menu | Ingredients | Quantity | Method of preparations |
|----------------------|-------------|--------------------|-----------------|-------------------------------|
| Early morning | | | | |
| Break fast | | | | |
| Lunch | | | | |
| Evening tea | | | | |
| Dinner | | | | |
| Bed time | | | | |

APPENDIX II PROCUDRES FOR ESTIMATION OF NUTRIENTS

A. DETERMINATION OF MOISTURE CONTENT

Aim:

To determine the moisture content of the given food sample and calculate the percentage of moisture content.

Principle:

Estimation of moisture is one of the most often performed determinations in food analysis. Moisture is lost when food is heated not much higher than the temperature of boiling water or by allowing to stand overnight over dehydrating agent or by heating over vacuum.

Apparatus:

Low flat-bottomed dishes, asbestos, analytical balance, weight box, tongs, desiccators and electric oven.

Procedure:

Heated a pair of weighing bottles at 100⁰ c in an oven and labeled A and B. Placed on an asbestos sheet for 2 minutes and then transferred them to a desiccators where they remained for half an hour. Recorded their weights in an analytical balance repeated this procedure till two successive weights obtained were constant (with maximum difference of 0.0002g).

Weighed definite amounts of food materials (2g) in each dish and placed in an electric oven thermostatically controlled at 100- 150⁰c. Heated for a stipulated time (2 hours), cooled in a desiccators for half an hour and weighed. This was also weighed till successive weightings showed no further loss.

Precautions needed:

1. Handle the bottles always with a clean pair of tongs.
2. Always keep the oven closed.
3. Do not expose the bottles to atmospheric air to avoid the change of atmospheric moisture getting in.
4. Check for the appropriate placement of the lid of the desiccator.
5. Avoid placing a dish in a desiccator for more than half an hour.
6. Keep the door of the analytical balance shut.
7. Take care of the food sample for its purity. i.e free from non-edible impurities.

The loss of weight equals the moisture present in the sample. The loss of weight divided by the weight of the original sample multiplied by 100 gives the percentage of moisture.

Result:

B. DETERMINATION OF ASH CONTENT

Aim:

To determine the ash content of the given food sample.

Principle:

By continuous heating, the substance gets charred which can be used for the determination of minerals presents.

Apparatus:

Porcelain crucible, Clay pipe triangle, Muffles furnace, Desiccators, Weighing balance, Asbestos sheet.

Procedure:

About 5 g of the sample was weighed accurately into a tarred platinum or porcelain crucible (which had previously been heated to about 600⁰c and cooled). The crucible was then placed on a clay pipe triangle and heated over a low flame till all the material was completely charred, followed by heated in a muffle furnace for about 3-5 hours at 600⁰c. The crucible was then cooled in a desiccator and weighed.

To ensure completeness of ashing heated in a muffle furnace for half an hour, cooled and weighed. This was repeated till two consecutive weights were the same and ash was almost white or greyish white in colour.

Result:

The ash content of food sample is ----- g of ash contain

C. DETERMINATION OF FIBRE CONTENT

Aim:

To determine the fibre content of the given food sample.

Principle:

The term “crude fibre” ordinarily meant in agriculture and food analysis is the organic residue consisting largely of cellulose, that is left after other carbohydrates and proteins have been removed by successive treatment with boiling acids and alkalis. The crude fibre obtained in this way is not cellulose but contains distinct properties of hemicelluloses, and nitrogenous substances. These however are not sufficient to prevent the results from being reasonably accurate and comparable.

Apparatus:

Weighing balance, Beaker, Glass rod, Funnel, Muslin cloth, Burner and Wire gauze.

Reagents:

1. 0.255N Sulphuric acid: 0.9 ml of Sulphuric acid in 99.1ml water.
2. 0.313N Sodium hydroxide: 0.8g Sodium hydroxide in 99.2ml water.
3. Ether
4. Alcohol

Procedure:

5g of the sample was weighed into a 500ml beaker and 200ml of boiling 0.255N sulphuric acid was added. The mixture was boiled for 30 minutes keeping the volume constant by adding water at frequent intervals (a glass rod inserted in the beaker helps smooth stirring and boiling). At the end of the period, the mixture was filtered through a muslin cloth and the residue was washed with hot water till free from acid. The mixture was then transferred to a beaker containing 200ml of boiling 0.313N sodium hydroxide. After boiling for 30 minutes (keeping the volume constant as before) the mixture was filtered through a muslin cloth. The residue was washed with hot water till free from alkali following by washing with some alcohol and ether. It was then transferred into a crucible, dried overnight at 80-100⁰c and weighed. The crucible was heated in a muffle furnace at 600⁰c for 2-3 hours. Cooled and weighed again. The difference in the weight represents the weight of the fibre.

Results:

100g of sample contains ----- of fibre.

D. ESTIMATION OF TOTAL CARBOHYDRATE BY ANTHRONE METHOD**Aim:**

To estimate the amount of total carbohydrate present in the given food sample.

Principle:

Carbohydrates are hydrolyzed into simple sugar using dilute hydrochloric acid. In hot acidic medium glucose is dehydrated to hydroxyl methyl furfural. This compound forms with anthrone, a green colour with an absorption maximum at 630nm.

Reagents:

1. 2.5mlN HCL
2. Anthrone reagents: Dissolved 200mg anthrone in 100ml of ice cold H₂SO₄, prepared fresh before use.
3. Stock standard : dissolved 100mg glucose in 100ml of water.

4. Working standard: 10 ml of stock standard solution is diluted with 100ml distilled water. Stored refrigerated after adding a few drops of toluene.

Procedure:

1. Weigh 100mg of sample into a boiling tube.
2. Hydrolyse by keeping it in boiling water bath. Boiled for 3 hours with 5ml 2.5N HCL and cool to room temperature.
3. Neutralize it with solid sodium carbonate until effervescence ceases.
4. Make up the volume to 100ml and centrifuge. Collect the supernatant and 0.5ml and 1 ml aliquots for analysis. Prepared the standard by taking 0.0, 0.2, 0.4, 0.6, 0.8 and 1ml of the working standard '0' serves as blank.
5. Make up the volume to 1ml in all the tube including the sample tubes by adding distilled water.
6. Then added 4ml of anthrone reagent and heat to 8 minutes in boiling water bath. Cool rapidly and read the green to dark green colour at 630nm.
7. Draw a standard graph by plotting concentration of the standard on the x axis versus absorbance on the y axis. From the graph calculate the amount of carbohydrates present in the sample tube.

Result:

Amount of carbohydrate present in 100ml of the food sample is

E. ESTIMATION OF NITROGEN

Aim:

To determine the amount of nitrogen present in the given sample.

Principle:

The given sample is digested with concentrated sulphuric acid in a macrokjeldahl flask when nitrogen gets converted to ammonium sulphate. Ammonia is liberated by the action of strong alkali in a macrokjeldahl steam distillation apparatus. This nitrogenous substance is converted to ammonium borate by absorbing 2% boric acid is titrated against N 70 sulphuric acid. The volume of acid required to bring the test sample to the colour of the blank of the blank gives the equivalent to the ammonia.

Reagents:

1. N/70 Sulphuric acid
2. 40% Sodium Hydroxide
3. 2% Boric acid(in warm water)
4. Digestion mixture: A mixture of copper sulphate and potassium sulphate in the ratio of 2:98
5. Concentrated Sulphuric acid
6. Mozazaga indicator: A mixture of bromocresol green and methyl red indicator in 95% alcohol in the ratio of 4:1 (80 mg and 20 mg in 100 ml of alcohol).

PROCEDURE:

1. 0.5 g of the sample was taken into the digestion flask. To this added 15ml of concentrated sulphuric acid and a pinch of digestion as a catalyst. Kept at boiling gently over a heating mantle.
2. After digestion, the flask was cooled and the contents were transferred to a 100ml of standard flask and made upto the mark with distilled water.
3. The whole apparatus was washed with distilled water and allowed to back suck.
4. 10ml of boric acid was taken in a conical flask. A drop of indicator was added to it and kept under the condenser.
5. The tip of the condenser was well below the liquid.
6. 5ml of the digested blank was added into the distillation chamber through the funnel. Then added 10 ml of 40% of NaOH. Washed the funnel with 2-3ml of distilled water.
7. Closed the tap and the steam was generated.
8. Steam entered the distillation chamber and drove all the ammonia which is in turn absorbed by boric acid.
9. Solution was pinkish white in colour, turned blue.
10. Steam was passed for 5min and then the conical flask was lowered and the tip of the condensor washed.
11. The boric acid solution containing the liberated ammonia was titrated against N/70 H_2SO_4 .
12. The end point was the appearance of pale permanent pink colour.
13. Between each estimation, the apparatus was washed.
14. The experiment was repeated to get concordant values.

RESULT:

The nitrogen content in 100g of food sample is..... mg.

F. DETERMINE OF FAT CONTENT

Aim:

To determine the fat content of the food stuff.

Principle:

Ether extraction of the crude fat in vegetable products is carried out in a continuous extractor that is an apparatus in which the ether, after dissolving a portion of the fat of the materials and discharging into the extraction flask, is volatilized, condensed and again allowed to act on the material. The steps in the process are repeated continuously and automatically until the extraction is complete.

The soxhelt extraction used depends on the intermittent action of a glass syphon. The ether gradually condenses into the extraction tube containing the material until it rises to top when it is discharged into the extraction flask.

Reagent:

Petroleum ether (60-80⁰ c boiling point).

Procedure:

The soxhelt flask was weighed to consecutive concordant weights. 2g of the moisture free sample was packed into an extraction thimble and placed in an extractor which was fixed into a soxhlet flask. Poured sufficient amount (150ml) of petroleum ether so as to permit syphon action. The thimble and the contents were allowed to soak in ether for 24 hours. The entire set up was kept over an electric water bath and the extractor was connected to the condenser. The nozzle of the condensor was always plugged with moistened cotton. The temperature was maintained at 60⁰c. A steady stream of water in the condensor was maintained. The ether evaporated rose up but owing to the condensor arrangement, it fell back into the condensor extractor. When the extractor got filled with ether, it was siphoned back into the flask. This went on till the ether that got collected in the extractor was free from any yellow colour indicating the presence of fat. The soxhelt flask was then disconnected and ether was evaporated in a water bath maintained at 60⁰c. When the ether in the flask was evaporated, the flask was weighed again to get concordant values. From the difference in weight, the fat content was calculated.

Result:

The fat content of 100g of sample contains =

G. ESTIMATION OF CALCIUM

Aim: To estimate the amount of calcium present in the given sample.

Principle:

Calcium is determined by the precipitating it as calcium oxalate and titrating the oxalate solution in dilute sulphuric acid against standard potassium permanganate.

Apparatus:

Beaker, Burette, Pipette flask and Standard flask.

Reagents:

1. **AMMONIUM OXALATE (4%):** Ammonium oxalate was dissolved in 200ml of distilled water till it was saturated.
2. **2.0.01 N OXALIC ACID:** 0.063g oxalic acid crystals were weighed and dissolved in 100ml of distilled water.
3. **0.01 N KMNO₄:** 0.316g of KMNO₄ was dissolved in 1000ml of distilled water.
4. **Strong Ammonia**
5. **Glacial Acetic Acid**
6. **2N Sulphuric Acid :** 5.5 ml of sulphuric acid was dissolved in 94.5ml of distilled water.

PROCEDURE:

Ash from the ignited sample was dissolved in hydrochloric acid and made upto the 100ml with distilled water. 10ml of the ash solution was pipette out in a conical flask and 90ml distilled water was added to it. Added 2 drops of methyl red indicator. It was made strongly alkali by adding ammonia and kept for boiling 20ml of saturated ammonium oxalate was added to the solution 10 ml each time to ensure complete precipitation directly. When it was hot, a few drops of acetic acid was added to render the medium acidic. The precipitate was allowed to settle overnight. The next morning the solution was filtered with What man No:40 filter paper. The precipitate was washed first with ammonical water and then with hot water several times until it was free from chloride. To test it 5ml of washing was collected, in a test tube and a drop of calcium chloride solution was added. The washing was continued til there was no precipitate with silver nitrate or calcium chloride solution. The filter paper was collected in a flask by making a hole in the filter paper. To this 2ml of 2N sulphuric acid was added. This solution was heated to 60⁰ -80⁰ C and when still hot was titrated against N/100 potassium permanganate solution. From the volume potassium permanganate solution used up the milligram of calcium present in 100g of sample was calculated.

RESULT:

100g of sample contains ----- milligram of calcium.

H. ESTIMATION OF IRON

Aim:

To estimate the amount of iron present in 100g of the given food sample.

Principle:

The food sample is oxidized with ignition or oxidation. Iron as ferric iron reacts with ammonium thiocyanate or with potassium thiocyanate to give ferric thiocyanate which is red in color. The color which is a measure of the concentration is measured colorimetrically.

Apparatus:

Volumetric flask, Test tubes, Klett, Pipettes.

Reagents:

1. Stock iron solution: Dissolved 0.0702gm (70.2mg) of reagent grade crystalline ferrous ammonium sulphate (Mohr's salt) in 100ml of water.
2. Working standard: prepared a working standard solution in a 100ml volumetric flask by adding 10ml of the stock solution and diluted to the mark with distilled water.
3. Saturated potassium persulphate solution: stock 7 to 8g of reagent grade potassium persulphate in 100ml of water in a glass stoppered flask. The undissolved crystals settled to the bottom and compensate the loss by decomposition.
4. 3N Potassium thiocyanate: Dissolved 146g of reagent grade potassium thiocyanate in water and diluted to 500ml with water filtered if turbid. Added 20ml of pure acetone to improve the keeping quality. Deterioration will be evident from the rapid fermentation of a yellow color in the blank. Stored in brown bottles.

Procedure:

2g of the sample was ashed by ignition. When ashing had been completed 5ml of hydrochloric acid was added and made up to 100 ml in a volumetric flask. Took different aliquots of the standard solution (1ml-5ml) to corresponding to 10-50 gamma in a series of the test tube. Added 1ml of 30% H_2SO_4 , 1ml of potassium persulphate and 1.5ml of potassium thiocyanate to all the test tubes. This was made up to 10ml with water. A blank was prepared by adding the reagents except the standard or the unknown solution. Allowed the colour to develop for 20 minutes and the intensity was read at 530-540 μ filters in the colorimeter.

Result: 100g of sample contains ----- milligram of iron.

I. ESTIMATION OF PHOSPHORUS

Aim:

To estimate the amount of phosphorous present in the given sample.

Principle:

When the ash solution is treated with ammonium molybdate, phosphomolybdic acid is formed. Phosphomolybdic acid is reduced by the addition of 1, 2,4 amino naphtholsulphonic acid reagent to produce a blue colour which is apparently a mixture of oxides of molybdenum. The intensity of the colour developed is the measure of phosphorous present.

Apparatus:

Measuring cylinder, Klett, Test tubes and Pipette.

Reagents:

1. Molybdate solution No 1:

Dissolved 25g of reagent grade ammonium Molybdate I in about 200ml of water. In one litre volumetric flask 500ml of 10N sulphuric acid was added. The molybdate solution was added and dilute with water to one litre. This solution is stable indefinitely.

2. Molybdate solution No.II:

Dissolved 25g of reagent grade ammonium Molybdate II about 200ml of water. In one litre volumetric flask, 300ml of 10N sulphuric acid was added and was dilute with water to one litre. This solution is stable indefinitely.

3. ANSA:

195ml of 15% sodium bisulphate solution was placed in a glass stoppered cylinder. 0.5g of 1, 2, 4 ANSA (amino naphtholsulphonic acid) was added followed by 5ml of 20% sodium sulphite. Put the stopper and shook until the powder was dissolved. If the solution was not complete, added more sodium sulphite, 1ml at a time with shaking but avoided excess. This solution was transferred to a brown glass bottle and stored in the refrigerator.

4. Stock standard phosphorus solution:

35.1mg of pure potassium dihydrogen phosphate is weighed and dissolved in water. Added 10ml of 10N sulphuric acid and made upto 100ml with water. 5ml of the solution contains 0.4mg of phosphorus. Prepared a working standard containing 8 gamma of phosphorus in 1 ml of the solution by making up 5ml of the standard solution to 50ml with water.

Procedure:

0.1ml of the ash solution was taken in two test tubes. 1ml of molybdate II and 0.4ml of 1,2,4, amino naphtholsulphonic acid were added and the volume was made upto 10ml with distilled water. To 1ml, 2ml, 3ml,4ml and 5ml of standard solution, 1ml of molybdate I solution and 0.4ml of ANSA were added and made upto 10ml. All the tubes containing 10ml of the solution were mixed well and allowed to stand for 15 minutes. Simultaneously, a blank was prepared by mixing 8.6ml of water, 1ml of molybdate II and 0.4ml of ANSA. The colour developed was read in the colorimeter using red filter of wavelength 660 millimicrons.

Result:

100g of the foodstuff contains = of phosphorus.

J. ESTIMATION OF VITAMIN 'C' BY DYE METHOD**Aim:**

To estimate the amount of vitamin c present in the given sample.

Principle:

Vitamin c is a good reducing agent and it reduces the dye 2,6dichlorophenol indophenol. In this reaction the ascorbic acid itself is oxidized to dehydro ascorbic acid. In the absence of interfering substances, the capacity of the extract of the sample to reduce a standard solution of a dye as determined by titration is directly proportional to the vitamin C content .oxalic acid is not only used to reduce the pH of the extracting medium, there by establishing the vitamin C but also form complexes with metals eg. Copper thereby preventing the catalytic oxidation of vitamin.

Apparatus:

Centrifuge, centrifuge tubes, mortar and pestle, beakers, pipette, 100ml standard flask, burette and funnel.

Reagents:

1.2,6 Dichlorophenol indophenol dye: Dissolved 42mg of bicarbonate and 52mg of 2, 6 dicholorophenol indophenol in about 50ml of water. This was diluted to 200ml, filtered, and stored in the refrigerator.

2. 4% Oxalic acid: Dissolved 4g oxalic acid in 100ml distilled water .

3. Standard ascorbic acid: Dissolved 100mg of pure ascorbic acid crystals in 100ml of 4% oxalic acid.

Standardization of the dye:

Pipette out 10 ml of the standard ascorbic acid solution into a beaker and then added 25ml of oxalic acid. From this solution pipetted out 5ml into a conical flask and placed in an ice container and the contents were titrated against the dye in the burette. The end point was the appearance of pink colour which persisted for 30 seconds. The amount of dye consumed is equivalent to the amount of ascorbic acid present.

Procedure:

5g of the sample was weighed and soaked in 40% oxalic acid for 10 mts. This was then ground in a mortar and transferred to centrifuge tubes adding more oxalic acid. The solution was centrifuged and the supernatant clear liquid was transferred to a 100ml standard flask. Repeated the extraction with oxalic acid for three or four times. All the supernatants were collected in the same standard flask and this was finally made up to the mark with acid.

The dye was taken in a micro burette and titrated against 5ml of the extract in a beaker. The end point was the appearance of pink color which persisted for 30 sec. The titration was repeated till concordant values were obtained.

Result:

100g of food sample contain ----- mg of ascorbic acid

K. ESTIMATION OF CAROTENE (BETA CAROTENE)**AIM:**

To estimate the amount of carotene in 100g of food sample.

PRINCIPLE:

Carotene present is extracted with petroleum ether and the intensity of the color of the colour of the extract is compared with that of the standard solution using a colorimeter

REAGENT:

1. Stock standard solution: 1mg of the standard carotene was weighed and made up to 10ml with petroleum ether.
2. Working standard: 2ml of the stock standard was taken and made up to 50 ml with petroleum ether.
3. 95% ethanol
4. 85% ethanol
5. Petroleum ether (40 to 60)

PROCEDURE:

The given sample was pulverized with 95% ethanol .the suspension was refluxed for about half an hour in a boiling water bath. The clear supernatant was filtered, diluted with 20 ml of 85% ethanol. Extracted the solution repeatedly with petroleum ether using 20 ml portion every time and the extraction was done for 3 or 4 times . Carotene was extracted in the petroleum ether pooled the ether extracts and made up to 100ml with ether.

Take different volumes of standard carotene solution 2 to 8ml corresponding to 40 to 160 gama. The volumes of all solution were made up to 8ml with petroleum ether. The extract was considered to be unknown .8 ml of the made up extract was taken for the experiment .The color developed was read at 540 μ g in a colorimeter.

PRECAUTIONS:

No water should be used throughout the experiment either for rinsing or for makeup only petroleum ether should be used.

RESULT:

100g of food stuff contain ----- μ g of carotene

L. DETERMINATION OF PHYTATE

Phytate was extracted according to the procedure described by Mohammed et al. [16]. 1.0 g Sample was extracted with 3% trichloro acetic acid (TCA) at 37 $^{\circ}$ C for 45 min. with simple shaking followed by centrifugation and extractation by using anion exchange column. The extracted phytate (0.2 ml) was mixed with 4.6 ml of distilled water and 0.2 ml of chromogenic solution and the tubes were heated in a water bath at 95 $^{\circ}$ C for 30 min, and then were allowed to cool. The developed color was read at 830 nm against blank. Standard phytate solution was prepared by dissolving sodium phytate in distilled water to prepare different phytate concentrations as described above in the tested samples. The amount of phytate in the tested samples was expressed as mg with homogenizer at 27,000 rpm for 261 min. with a 1 min delay in-between. The resulting crude homogenate was centrifuged at 10,000 g for 30 min. The supernatant containing phytase activity was collected.

APPENDIX - III

SCHEDULE TO ASSESS THE SENSORY EVALUATION OF READY TO EAT FOODS

Name of the Panel Member :

Code of the food :

| Criteria | Standard | Variation I | Variation 2 | Variation 3 |
|-----------------------|----------|-------------|-------------|-------------|
| Appearance | | | | |
| Colour | | | | |
| Flavour | | | | |
| Taste | | | | |
| Texture | | | | |
| Doneness | | | | |
| Overall Acceptability | | | | |

Scores: 1 to 9

Date

Sign

APPENDIX - IV

Schedule to elicit information regarding personal and social characteristics Adolescent girls

1. Name of the Family Head :
2. Address :
3. Contact No.
4. Age :
5. Sex :
6. Marital status :
7. Religion :
8. i) Hindu ii) Christian iii) Muslim
9. Caste :
10. Forward
11. Backward
12. Most backward
13. Schedule caste
14. Schedule tribe
15. Type of Family :i) Nuclear Family ii) Joint Family
16. Family Composition :
17. Details regarding family members

| Sl.No. | Name of the family member | Relationship | Age | Educational Status | Occupation |
|--------|---------------------------|--------------|-----|--------------------|------------|
| | | | | | |

18. Total Family Income :

Schedule to elicit information regarding Frequency of Food consumption by the Households

1. Eating Habit of the household :

i) Veg ii) Non- veg iii) Ovo- veg

2. What are the different processing methods practiced in the home for the following Food items

| S. No. | Food items | Soaking | Malting | Roasting | Powdering |
|--------|---------------------|---------|---------|----------|-----------|
| | Cereals | | | | |
| 1. | Jowar | | | | |
| 3. | Bajra | | | | |
| 3. | Maize | | | | |
| 4. | Ragi | | | | |
| 5. | Samai | | | | |
| 6. | Varagu | | | | |
| | Pulses | | | | |
| 1. | Soyabean | | | | |
| 2. | Bengal gram (Whole) | | | | |
| 3. | Green gram (Whole) | | | | |
| 4. | Horse gram (Whole) | | | | |
| 5. | Green peas | | | | |
| 6. | Cow pea | | | | |
| 7. | Rajmah | | | | |

3. Do you have the habit of eating outside? If yes which meal?

4. Do you have the habit of consuming fast foods?

5. Frequency of consuming fast foods –

Daily Weekly once Fortnightly Monthly Occasionally Never

6. What are the commonly consumed fast foods?

7. Do you suffer from any illness during the past one month

8.Details of previous day's food consumption

| Meal | Menu | Ingredients | Quantity | Method of preparations |
|----------------------|-------------|--------------------|-----------------|-------------------------------|
| Early morning | | | | |
| Break fast | | | | |
| Lunch | | | | |
| Evening tea | | | | |
| Dinner | | | | |
| Bed time | | | | |

APPENDIX - V

Form for clinical examination

| | | | |
|---|---|------------|-----------|
| Name | : | | |
| Age | : | | |
| Presence of Clinical Signs | : | Yes | No |
| Free from clinical signs | : | | |
| Pale Skin | | | |
| Lusterless hair | : | | |
| Thin, easily pluckable and sparse hair | : | | |
| Koilonchia | : | | |
| Angular stomatitis | : | | |
| Magenta tongue | : | | |
| Dental caries | : | | |
| Mottled enamel | : | | |
| Tiredness / Fatigue | : | | |

APPENDIX - VI

Nutritional potentials of the regional diets

| REGIONAL DIETS | Energy (K.cal) | Protein (g) | Carbohydrate (g) | Fat (g) | Fibre (g) | Calcium (mg) | Phosphorus (mg) |
|----------------|----------------|-------------|------------------|---------|-----------|--------------|-----------------|
| Dosa | 258.08 | 6.93 | 45.18 | 5.36 | 0.21 | 30.33 | 65 |
| Idli | 251.52 | 6.47 | 43.62 | 5.23 | 0.21 | 26.75 | 61.25 |
| Appam | 271.90 | 4.56 | 47.87 | 6.42 | 0.61 | 7.24 | 63.75 |
| Rice puttu | 282.25 | 4.49 | 41.55 | 5.02 | 0.87 | 6.95 | 60.02 |
| Wheat puttu | 280.05 | 6.09 | 36.92 | 5.01 | 1.76 | 25.82 | 121.02 |
| Rava Upma | 185 | 4.9 | 14.25 | 10.2 | 5.01 | 12.0 | 20 |
| Semiya Upma | 196 | 3.1 | 28.3 | 6.3 | 1.2 | 1.50 | 45.0 |
| Daliya | 78 | 2.5 | 8.9 | 3.6 | 0.61 | 25.12 | 41 |
| Idiyappam | 264 | 3.1 | 42.7 | 10.9 | 1.12 | 26.75 | 90 |
| Chapathi | 185 | 6.1 | 30.02 | 10.05 | 1.5 | 7.24 | 110.65 |
| Puri | 180 | 2.0 | 32.40 | 12.0 | 1 | 25.12 | 120 |
| Ven pongal | 146.50 | 4.12 | 25.50 | 8.08 | 0.5 | 30.33 | 130.57 |

| REGIONAL DIETS | Energy (K.cal) | Protein (g) | Carbohydrate (g) | Fat (g) | Fibre (g) | Calcium (mg) | Phosphorus (mg) |
|-----------------------|-----------------------|--------------------|-------------------------|----------------|------------------|---------------------|------------------------|
| Rice | 110 | 2 | 25.02 | 25 | 1.12 | 26.75 | 123.58 |
| Lime rice | 162.20 | 5.02 | 28.6 | 10 | 1.01 | 7.24 | 128.52 |
| Sesame rice | 175 | 4.0 | 30.9 | 9.5 | 1.05 | 185.05 | 211.70 |
| Tomato rice | 223 | 5.8 | 21.6 | 13.8 | 1.02 | 6.95 | 71 |
| Rice Kanji | 121 | 2.3 | 27.7 | 0.2 | 1.12 | 25.82 | 49 |
| Sambar | 80 | 8 | 3.5 | 6 | 3.2 | 26.75 | 35.15 |
| Potato Kuruma | 130 | 2 | 4.9 | 10 | 2.1 | 7.24 | 28.5 |
| Spinach dal kootu | 125 | 2 | 10 | 6 | 2.5 | 30.2 | 65.40 |
| Cabbage poriyal | 45 | 1.1 | 4 | 2 | 1.25 | 1.05 | 65.8 |

APPENDIX - VII

GLOSSARY OF REGIONAL DIETS

- **Idli** - It is a south Indian steamed cake made from rice and urad dal (3:1) batter fermented.
- **Dosa** - It is a fermented crepe made from rice batter and black lentils. The proportion of rice to lentils is basically 4:1 or 5:1.
- **Appam** - It is a pancake made with fermented rice batter and coconut milk.
- **Rava/Semiya Upma** – prepared by seasoned dry roasted rava or vermicelli or semolina . Vegetables are added during the cooking, depending on individual preferences.
- **Idiyappam** - It is also known as noolputtu or string hoppers made of dry roasted rice flour into noodle form and then steamed
- **Roti** - It is an Indian bread, made from stoneground rice flour
- **Rice Kanji** - It is a porridge/ gruel made by boiling ground or crushed rice in water, milk, or both, with optional flavourings
- **Rice** - It is a dish made of ground rice / wheat flour layered with coconut and steamed in cylinders
- **Sweet pongal** - It is cooked rice with split urad dal and jiggery
- **Ven Pongal** - It is cooked rice with split urad dal. Seasoned with pepper corn, cumin seeds, ginger and curry leaves
- **Tamarind rice** - Seasoned rice made with concentrated tamarind juice with spices
- **Tomato rice** – Seasoned rice made with tomato pulp, onion and spices
- **Mint rice** – Seasoned rice made from crushed mint leaves and spices
- **Lemon rice** – Seasoned rice made with limejuice and spices
- **Curd Rice** - – Seasoned rice made with curd, mint leaves and spices
- **Sesame rice** – Seasoned rice made with sesame powder and spices
- **Vegetable biriyani** – Seasoned rice made with mixed vegetable and spices
- **Laddu or Urundai**- Is made of flours of rice or multi grains with jaggery syrurp

- **Sambar** - A lentil based vegetable stew or broth made of mixed vegetables , tamarind, asafetida
- **Pulikozhambu**- A vegetable stew made of tamarind pulp
- **Urundai Kuzhambu** - also known as Lentil balls in tamarind sauce
- **Aviyal** - A thick mixture of vegetables with coconut, seasoned with coconut oil and curry leaves.
- **Poriyal** – A dish of sauteed vegetable (any vegetables) made by shallow frying of chopped vegetables with spices, coconut and mustard
- **Kootu** - A dish made with vegetables and dal. It will be semisolid in consistency