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# **NUTRITIONAL PROFILE OF WOMEN LABOUR IN RICE CULTIVATION**

By

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(2000-16-03)

## **THESIS**

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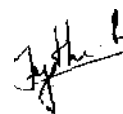
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## DECLARATION

I hereby declare that the thesis entitled "Nutritional profile of women labour in rice cultivation" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

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## CERTIFICATE

Certified that the thesis entitled "Nutritional profile of women labour in rice cultivation" is a record of research work done independently by Miss. Jyothi. R, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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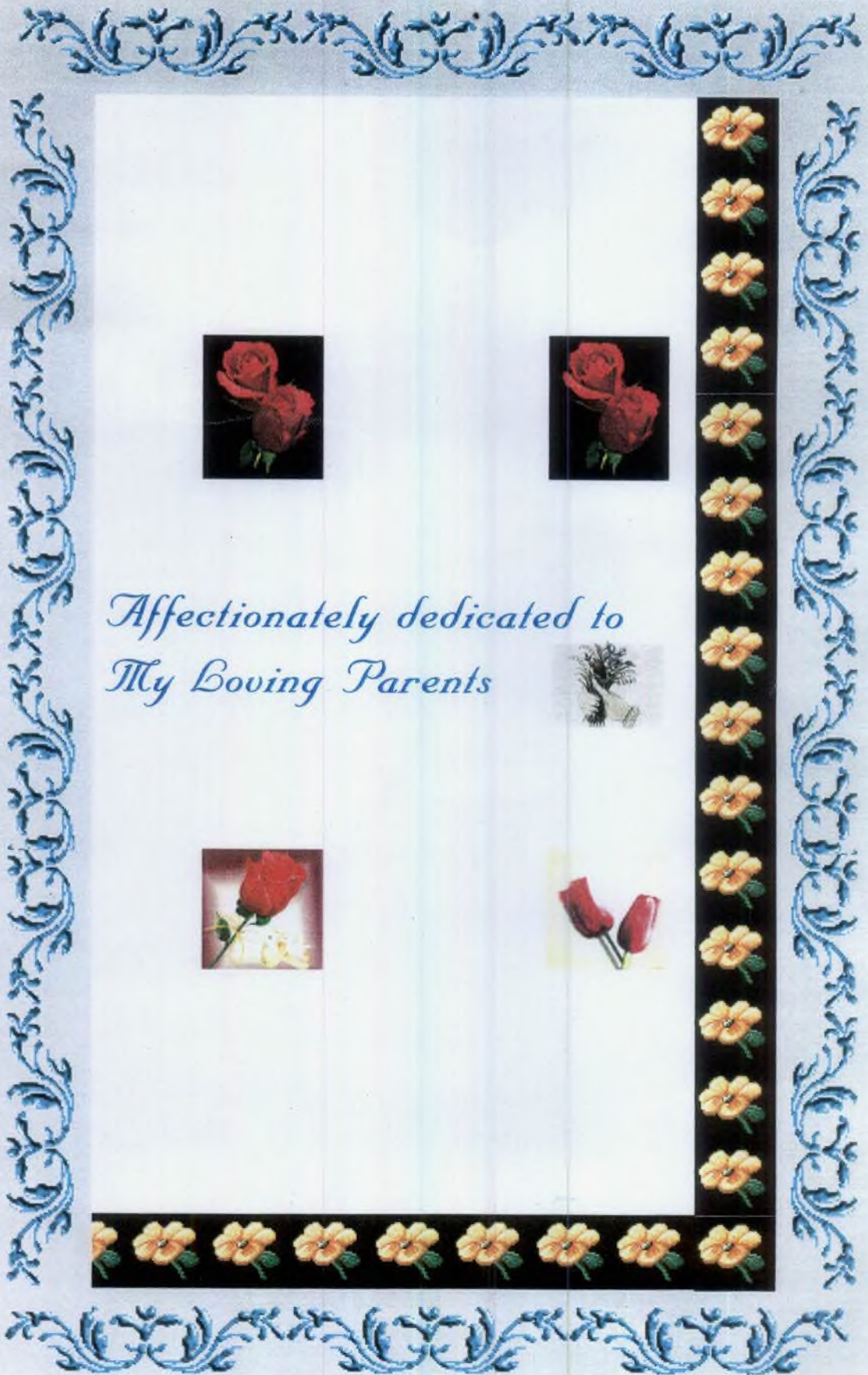
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**Jyothi. R**



*Affectionately dedicated to  
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## CONTENTS

CHAPTER No	TITLE	PAGE No.
1	INTRODUCTION	1-3
2	REVIEW OF LITERATURE	4-22
3.	MATERIALS AND METHODS	23-37
4.	RESULTS	38-88
5.	DISCUSSION	89-112
6.	SUMMARY	113-119
	REFERENCES	i-xxxi
	APPENDICES	
	ABSTRACT	

## LIST OF TABLES

TABLE NO	TITLE	PAGE NO.
1	Details of religion, caste, type of family and family size.	39
2	Distribution of family members on the basis of age and sex	40
3	Educational status of family members	41
4	Educational status of respondents	42
5	Educational status of children and adolescents	43
6	Occupational status of family members	44
7	Marital status of respondents	45
8a	Details on the availability of land	46
8b	Details on how the land was received by the families	46
9	Details about cultivation of crops	47
10a	Details regarding the domestication of animals	48
10b	Details regarding income from the domestication of animals	48

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE NO.</b>
11	Monthly income of the family	48
12	Details of loan taken by the families	49
13	Details of monthly expenditure pattern of families	51
14	Housing conditions of the families	53
15	Details regarding type of fuel	55
16	Health care facilities in the locality	56
17	Details of epidemics prevalent during the last one year	56
18	Details regarding social participation of the respondents	57
19	Distribution of families by monthly expenditure pattern for food	58
20	Frequency of intake of various foods	60
21	Frequency score on different food items	61
22	Classification of various food items on the basis of percentage frequency score	61
23	Details of meal pattern	63
24	Cooking pattern adopted by the families	64
25	Cooking methods adopted by the families	65

TABLE NO	TITLE	PAGE NO.
26	Details of food preservation	66
27	Details of foods given during special conditions	66
28	Distribution of respondents on the basis of weight and height	69
29	Prevalence of CED among the respondents on the basis of Body Mass Index	70
30	Mean anthropometric measurements by CED grades among women agricultural labourers	70
31	Relationship between anthropometric measurements with BMI	71
32	Correlation coefficient of anthropometric measurements in different grades of CED	71
33	Mean food intake of the respondents in comparison with the RDA	73
34	Mean nutrient intake of the respondents in comparison with RDA	74
35	Coefficient of variation of different characters	75
36	Correlation between Body Mass Index and Independent Variables	77
37	Relation between family size and intake of roots and tubers	79
38	Clinical manifestations observed among the respondents	80

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE NO.</b>
39	Distribution of respondents on the basis of haemoglobin level	82
40	Distribution of respondents based on iron status	82
41	Details regarding the working pattern	84
42a	Comparison of the energy intake and expenditure pattern of women agricultural labourers	86
42b	Classification according to difference of daily energy intake from daily energy expenditure	88

## LIST OF FIGURES

FIGURE No	TITLE	BETWEEN PAGE
1	Percentage distribution of women labourers based on BMI	69-70
2	Food intake of women labourers as percentage of RDA	72-73
3	Nutrient intake of women labourers as percentage of RDA	73-74
4	Iron status of women labourers on the basis of haemoglobin level	82-83

## LIST OF APPENDICES

<b>APPENDIX No.</b>	<b>TITLE</b>
I	Interview schedule to elicit information on socio economic conditions of the families
II	Interview schedule to collect information on food consumption pattern of selected families
III	Schedule for clinical assessment
IV	Schedule for individual food weighment survey (one day weighment method)
V	Formula for calculation of food frequency scores (Reaburn <i>et al.</i> , 1979)

## ABBREVIATIONS

B	-	Boys
BMI	-	Body Mass Index
BMR	-	Basal Metabolic Rate
CED	-	Chronic Energy Deficiency
CV	-	Coefficient of variation
f	-	Number of families
G	-	Girls
Hb	-	Haemoglobin
ICMR	-	Indian Council of Medical Research
M	-	Men
n	-	Number
NIN	-	National Institute of Nutrition
NNMB	-	National Nutritional Monitoring Bureau
PG	-	Post Graduation
RDA	-	Recommended Dietary Allowance
W	-	Women
WHO	-	World Health Organisation
%	-	Percentage



# **Introduction**

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## INTRODUCTION

Agriculture is the back bone of Indian economy and is the mainstay of livelihood to majority of people in India. Women constitute the biggest source of potential workers in rural areas and they are the poorest section of Indian society. Women are involved in all aspects of agriculture from crop selection to land preparation, seed selection, planting, harvesting, handling, marketing and processing. Eventhough women and men are equal partners in the scene of agriculture, farm women in general continue to be 'invisible' and unaccounted. Though among the farm women, agricultural women labour contributions are accounted and paid, gender discriminations to which they are subjected are beyond exaggeration. It is observable that in almost all societies and culture there are gender specific division of labour and the gender biased valuing of labour in turn keep the women labour participation as less skilled, valued and low paid. Technology development efforts also largely surpass the activities of women labour.

Various agricultural operations which involve drudgery and physical labour make the women over burdened and under nourished. Moreover, the multiple tasks performed by the women in the field and home make their condition more worse. Thus, the status of women agricultural labourers is much lower than their male counterparts mainly due to male dominance in the society, inequality in the working conditions and poor accessibility to modern technologies.

Employment of women is the best and cheapest guarantee to improve the nutritional status of the family for middle and high income groups. But, for women who are employed

as labourers in the unorganised sector results in greater drudgery and poor nutritional status. This may increase their susceptibility to occupation related diseases and paves the way to complete the cycle of malnutrition.

It is important to recognize women's health needs as an integral part of both productive and reproductive functions by taking into account women's roles as an economic producer incorporating political, economic, behavioural, agricultural and health issues (Turshen and Mebrahter, 1991).

Hence, an attempt has been made in this study to find out the nutritional status of women agricultural labourers involved in rice cultivation with the following objectives.

1. To assess the socio economic status of agricultural labour families.
2. To assess the food consumption pattern of the agricultural labour families.
3. To assess the nutritional status and working conditions of the agricultural women labourers.
4. Find out the time and energy expenditure pattern of the agricultural women labourers.

## 1.1 NEED OF THE STUDY

Engagement of female labourers in farming activities is a main feature of Indian agriculture and is a main source of economic activities for women. Women are identified as the focal point for family health and nutrition. Nutritional status is the condition of health as it is related to the use of food by the body.

Very few studies has been conducted to explore the health status of women agricultural labourers. Hence, present study has been designed to study the nutritional profile of women labour in rice cultivation and factors contributing towards their health status.

## 1.2 SCOPE OF THE STUDY

The findings of the study will draw attention in formulating strategies that could improve women's health status which ultimately will result in effective participation and contribution of women in agricultural production. This study will highlight the need for nutrition education, programme for the improvement of health status of agricultural women labourers. The constraints identified in the nutrition education programmes would be helpful to evolve suitable strategies which empower the women in their health status. The observations of the study may also help to identify the importance of balanced low cost recipes for maintaining good nutritional status, need of increase of wage and equal wage for women agricultural labourers so as to increase the purchasing power and to identify the need for farm mechanisation for drudgery reduction.

## 1.3 LIMITATIONS OF THE STUDY

The present study had the limitation of time, finance and experience as it was undertaken as part of the requirement for the PG programme. Expressed opinion of the respondents may or may not be free from the individual biases and prejudices, will also be one of the important limitation observed in the present study. In spite of all these limitations accomplishment of the objectives to the maximum extent possible has been earnestly tried for.

# **Review of Literature**

## **REVIEW OF LITERATURE**

The review of literature relevant to the study entitled nutritional profile of women labour in rice cultivation is listed under the following headings.

- 2.1 Role of women in agriculture
- 2.2 Socio economic status of the agricultural labour households.
- 2.3 Food consumption pattern of the agricultural labour households
- 2.4 Nutrient intake and prevalence of nutritional deficiency diseases among women agricultural labourers
- 2.5 Factors influencing the nutritional status of women
- 2.6 Energy expenditure pattern of women agricultural labourers.

### **2.1 ROLE OF WOMEN IN AGRICULTURE**

Women are the back bone of Indian farming. Even though women are the essential productive workers in Indian economy they are considered to be the invisible workforce in agriculture (Sen, 1990).

According to 2001 census report, women constitute 51.42 per cent of the total population as against 48.58 per cent of male in Kerala (Farm guide, 2002). Working women in the organised sector constitute 10 per cent of the working force while in the unorganised sector it is 90 per cent (Alva, 1998).

Women performed tasks essential to any society's survival, from raising children to giving food and to feed their families (UNICEF, 1985). Manjulatha (1993) observed that in India more than 60 per cent of the agricultural operations are performed by women.

Engagement of female labour in farming activities is a common feature of Indian agriculture (Swamy and Vijayalakshmi, 1999). Rajalakshmi and Gayathri (2001) also indicated that farm women play a significant role in agricultural production. They also reported that farm women involve in activities such as harvesting, post harvest operations, cleaning and storing the grain, feeding cattle and kitchen gardening.

Saradhamani (1987) conducted studies in Kerala and Tamil Nadu and revealed that women made crucial contribution to the production and processing of rice. Haemalatha (1998) observed different roles of women in agriculture like pulling out seedlings from nursery bed, weeding, transplanting, harvesting, winnowing, dehusking, storage of dried seed, supervision of labourers, maintenance of cattle shed, management of milch animal and taking care of sick animal. Other activities of women include kitchen gardening, production of mushrooms using agricultural wastes, production of grafted and budded plants, nursery raising etc., through women's groups (Jayalakshmi, 1998). Since time immemorial our women labourers have been practising various cultural operations of paddy cultivation with their own specific skill and excellence (Gurumoorthy, 2000).

Nair (1990) showed that women worked for longer hours and contributed more on terms of total labour energy that was spend by the family members.

Absan (1986) observed that in Bangladesh 75 per cent of females spend 30 per cent of their time in agricultural activities. The author also pointed out that women from small farmer households spend more time in field agriculture, while women from larger farm households spend more time in homestead agriculture. However, the landless females were found to be involved in agricultural activities for earning direct income.

The analysis of gender division of labour in agriculture by Meena *et al.* (2000) indicated that women's work in agriculture and household activities is

significantly higher than men's work. According to Sundari (1990) and Rajuladevi (2001) the jobs, which are strenuous and arduous are kept aside exclusively for women and these jobs are termed as non-skill requiring and paid less for the same reason. Mor (2001) also indicated that Indian women work for 69 hours in a week where as men work only for 59 hours. Jejuverma (2002) noted that a woman on an average works, 3,380 hrs/hectare in a year which was equal to the combined work done by man and two bullocks.

Jhurani (1985) stated that multiple roles played by women inside and outside the house formed a part of their role. Singh *et al.* (1988) reported that women participated in various agricultural activities like sowing paddy, transplanting, threshing, and winnowing, grass cutting, feeding and milking of animals. Women played dual role both at home and working place (Usha *et al.*, 1990). In the rural areas women shoulder numerous responsibilities in home making and income generating activities (Vijayalakshmi, 1991). Mrunalini (1992) in a study conducted among women in the East Godavari district of Andhrapradesh revealed that irrespective of land holdings women participated in the household operations which comprised house keeping, food related and family care related operations. In fact, women are the better managers than men in fields of livestock management and poultry (Umarani, 1999).

Economic necessity, the need to augment family income and better social recognition were the chief reasons voiced by the women for entering the work arena (Rajkumar and Premakumari, 2000)

## 2.2 SOCIO ECONOMIC STATUS OF THE AGRICULTURAL LABOUR HOUSEHOLDS

Engagement of female labour in farming activities is a common feature of Indian agriculture and is a main source of economic activities for women. Women are being accepted in their role of wage earners to improve the economic status of the family (Jose and Indira, 2000).



Cherian (1992) in a study among the agricultural labourers of Trivandrum district revealed that majority of the families were small sized with three to five members. But, Usha *et al* (1990) and Augustine (1993) observed large sized families with five to ten members among the families of unorganised sector in Trivandrum district. Anil *et al.* (2001) also observed larger family size among the dairy farmers of Kerala with four to six members. Larger family size was also reported among labourer households of Hyderabad and Karnataka (Shatrugna *et al.*, 1993 and Swamy *et al.*, 2000)

Cherian (1992) and Smitha (1999) observed that majority of the agricultural labour families surveyed in Trivandrum and Trichur districts of Kerala were nuclear type and followed patriarchal family system. Swamy *et al.* (2000), Anil *et al.* (2001) and Ukkru (2001) also observed nuclear type families among labour households.

In a study conducted among the farm families in Trivandrum district, it was reported that majority were Hindus and belonged to scheduled castes (Thomas, 1989). However, Cherian (1992) reported that more than half of the women labourers of Trivandrum district were Christians and belonged to backward communities. Shyna (1996) and Smitha (1999) in their studies among the agricultural labour families of Thrissur district of Kerala revealed that majority of the families were Hindus. In Trivandrum district Ukkru (2001) observed that majority of the women workers belonged to backward and under privileged communities.

Among the women agricultural labourers of Trivandrum district Usha *et al.* (1990) observed that about 16 per cent of the women had upper primary and high school education.

A study conducted by Udaya (1996) among the farm women of Thrissur district indicated illiteracy among majority of women. Shyna (1996) also indicated higher percentage of illiteracy among women agricultural labourers. However Smitha

(1999) reported only 14 per cent of illiteracy among women agricultural labourers of Ollukkara block of Thrissur district.

Nair (1990) reported that about 79 per cent of women workers in Kerala were engaged in agricultural activities mainly as agricultural labourers. In Kerala, women labourers were found to be solely responsible for the cultivation of food crop (Usha *et al.* 1990). About 47 per cent and 37 per cent of rural women in north western India were classified as agricultural labourers and as cultivators respectively while the corresponding values for men were 20 and 44 per cent respectively (Grover and Grover, 1993). However, Udaya (1996) in a study among the farm families of Thrissur district of Kerala observed that only 14 per cent of farm women were engaged in agricultural related occupations where as 78 per cent were found to be involved in household work.

Khan and Sharma (1971) classified the farmers into three categories as small, medium and big farmers on the basis of land holdings. Economic activities of the farmers were found to be dependent on the size of land holdings and was one of the chief determinants of their resource position (Grabowsky, 1987). According to Arora (1990) the size of the land holdings i.e., large, small, medium, marginal and landless labour exercised a commanding influence on work participation of rural women. Minocha (1995) observed that two third of rural population consisted of small and marginal farmers and landless labourers.

According to Mellor (1984) health, nutrition and family planning programmes directly increase human welfare and enhance the effectiveness of the labour force thereby facilitating accelerated growth in income of the poor. Income generation raises the self-awareness and the capabilities of working women and has brought them to touch with the outside world (Vijayalakshmi, 1991).

Uno *et al.* (1991) reported that in Japan and other Asian countries actual agricultural labour evaluation and farmers' income had been declining in the economic

structure. Low level of income resulted from low labour productivity was closely related to increased land scarcity, slow compensating growth in human capital, absence of productivity, enhancing technology and deficiency in employment expanding infrastructure. Unemployment and under employment are the two important factors responsible for low income and consequently low economic position of the agricultural workers (Vasanthakumari, 1999).

Women's work for wages results in higher family income enabling them to purchase more food leading to better family health and nutrition, but decreases the time available for child care (NIN, 1993). The more the labourers were tied to the land of the farm owner, for both income and own food production, the more difficulties they faced in satisfying even their basic needs (Foeken and Tellegon, 1994).

### 2.3 FOOD CONSUMPTION PATTERN OF THE AGRICULTURAL LABOUR HOUSEHOLDS

Usha *et al.* (1990) in their study among the farm families of Trivandrum district showed that all the families were non-vegetarians. Yegammai and Ambili (1992) found that majority of the fisher folk families of Alleppy district were non-vegetarians. Similar findings were reported by Udaya (1996) and Smitha (1999) in their study among the farm women and agricultural labourers respectively.

Prema *et al.* (1982) reported that in Kerala, rice was the preferred cereal among the labourers but it was often replaced partly or wholly by roots and tubers. Cherian (1992) in a study among the agricultural labourers of Trivandrum district and Yegammai and Ambili (1992) among the fisher folk families of Alleppy district observed rice as their staple food. Other items in their diet included tapioca, fish, coconut, locally cultivated vegetables, milk, cooking oils and sugar. Udaya (1996) and Smitha (1999) also observed rice as the staple food item among the farm families and agricultural labourer families of Thrissur district. The authors reported that cereals,

other vegetables, fats and oils, spices and condiments and sugar were the most frequently used food items by these families.

Gopalan (1979) observed excess consumption of fish and tapioca in the dietary pattern of the Keralities. A study conducted by Devadas and Easwaran (1986) in the rural households of India revealed that festive occasions facilitated adequate food intake.

Rajkumar and Premakumari (1999 & 2000) in their studies among the women labourers of Coimbatore indicated decreased intake of protective foods in their diet. Rajuladevi (2001) in a study among the landless labour households of Tamil Nadu showed that majority of the households survived on cereals and the intake of most of the other food groups were low when compared with RDA. Rahman and Rao (2001) observed a lower intake of cereals and millets among the adults of Andhra Pradesh.

Arora (1992) and Tian *et al.* (1995) found distinct differences in dietary pattern and nutrient intakes between subjects living in urban and rural areas. Chadha *et al.* (1995) observed a lower intake of almost all the food groups except cereals among the rural community. The study of Kumar (1996) and Singh (1998) among the rural people in India reported higher consumption of cereals, pulses and millets. Singh and Agarwal (2001) in their study among the rural households of Delhi observed that intake of cereals and pulses were above the Recommended Dietary Allowance where as the intake of fruits, milk and milk products were much below the RDA. Similar report was given by Farzana and Manay (2000) in their study among the rural households of Karnataka. Meena *et al.* (2000) observed adequate intake of other vegetables, milk and milk products and fats and oils by the women in the rural areas of Parbhani district.

Deficient intake of pulses and green leafy vegetables was observed by Rao *et al.* (1976), Pushpamma *et al.* (1982), Cherian (1992) and Jayanthakumari (1993) among the rural Indian house holds.

The study of Khadka (2001) among the rural households of Nepal revealed that majority of the villagers consumed vegetables and fruits on the basis of seasonal availability. Labadarios (2001) and Min *et al.* (2002) observed a greater consumption of vegetables, fruits and animal foods among the rural households of Brazil and South East China respectively.

A higher intake of roots and tubers was reported by Augustine (1993) among the women engaged in stone breaking. Udaya (1996) and Smitha (1999) observed inadequate intake of productive foods like green leafy vegetables and fruits among farm women and women agricultural labourers.

#### 2.4 NUTRIENT INTAKE AND PREVALENCE OF NUTRITIONAL DEFICIENCY DISEASES AMONG WOMEN AGRICULTURAL LABOURERS

Women have been the focal point for family health and have been referred to as producer of health and nutrition for her family (Swamy and Vijayalakshmi, 1999). Women occupy an important position in any effort for controlling malnutrition as they are entirely responsible for the nutritional status of the family and hence the nation (Hemalatha *et al.*, 2000). According to the authors good nutritional status of women is essential to improve the quality of their present and future life as well as their family.

The average diet of the working women in all less developed countries is almost invariably inadequate in calories, animal proteins, vitamins and minerals necessary for proper health and optimum work efficiency (ICMR, 1990). Nation wide surveys have indicated that the nutritional status and the psychological needs of the women received low priority in the family (Deshpande *et al.*, 2001).

Prema (1978) in her study among the various women workers in India reported Inadequate intake of calories. Panicker (1979) observed an average calorie intake of 2200 Kilo calories daily among the agricultural labourer households of

Kerala. Among the low income labourer category of Punjab Ajula *et al.* (1983) also observed low calorie intake. Similar observations were reported among the spinning mill workers of Hyderabad (Kaur and Sood, 1988) and farmwomen (Usha *et al.*, 1990, Cherian, 1992 and Udaya, 1996), women engaged in stone breaking (Augustine, 1993) and women agricultural labourers (Smitha, 1999) of Kerala.

Sreenivasan *et al.* (1991) and Dungarwal and Choudhary (2001) also reported deficient energy intake among the low income groups in Tamil Nadu and the farm labourers of Agriculture Research Station, Rajasthan.

Among the women industrial workers, Singh and Chawla (1991) observed adequate intake of energy.

Among the rural households of different states like Maharashtra, Hyderabad and Delhi a deficient calorie intake was observed by Sar *et al.* (1991), Rahman and Rao (2000) and Singh and Agarwal (2001). But Farzana and Nanay (2000) observed optimum energy consumption in the rural households of Karnataka.

Swietochowska (1981) reported that 20-30 per cent of population in Poland consumed inadequate energy. Poor calorie intake was reported among the West African rural households (Josserand, 1985) and among the lower income groups in Pakistan (Butt *et al.*, 1989). Labadarios (2001) observed poor intake of energy among the rural families in South Africa.

Studies conducted among women engaged in stone breaking (Augustine, 1993), fish vending (Karuna, 1993) and adult females (Seshadrinath, 1993) had reported adequate intake of proteins. But Cherian (1992) and Udaya (1996) among the farm families of Thiruvananthapuram and Thrissur districts respectively observed inadequate intake of proteins. Smitha (1999) also reported inadequate protein in the diet of women agriculture labourers.

Lower intake of protein was observed among the farmers of Nigeria (Nicol and Philips, 1976), rural women in Eastern Highland Province (Muntiwiler *et al.*, 2000) and Northern Province in South Africa (Steyn *et al.*, 2001).

Cereals and Pulses were found to be the main sources of protein and calories in the diet of tribal and non-tribal house holds of Bihar (Singh and Kumari, 2001).

Yegammai and Ambili (1992) and Karuna (1993) reported fish as the main source of protein in the diet of fisher folk families of Alleppy and Thiruvananthapuram districts respectively.

A case study conducted among women living in nontidal swamps of Indonesia, Yuliati and Widowati (1998) observed local fresh water fish as the main source of protein in their diet.

Higher intake of all nutrients except iron was reported by Sidhu and Singh (1987) among the farm women of Ludhiana. Usha *et al.* (1990) observed lower intake of vitamins and minerals among the farm women of Trivandrum district.

In the fisher folk families of Alleppy district, Yegammai and Ambili (1992) observed a deficient intake of all nutrients except vitamin C. Karuna (1993) also reported inadequate intake of vitamins and minerals in the diet of women engaged in fish vending.

Inadequate intake of protective nutrients like vitamins and minerals in the daily diet of women in the unorganised sector like farming, agriculture labourers

and stone breaking was reported by Cherian (1992), Augustine (1993), Udaya (1996) and Smitha (1999).

A study conducted by Rahman and Rao (2000) among the families of various economic status reported a lower intake of vitamins and minerals in middle, upper middle and higher income groups.

Desai *et al.* (1989) conducted a study among the migrant women agricultural workers in a rural slum of Brazil and reported a deficient intake of vitamin A, iron, calcium, ascorbic acid and riboflavin. Min *et al.* (2002) also observed lower intake of vitamins and minerals in the diet of women in South East China. However, Yongok (2001) and Hua and Hage (2002) observed higher intake of most of the vitamins and minerals in the diet of women in Korea and China respectively.

The most important nutritional problems prevalent in India include protein calorie malnutrition, iron deficiency anaemia, iodine deficiency disorders, vitamin A and B complex deficiencies (Vijayalakshmi *et al.* 1987, Chakravarthy and Ghosh, 2000 and Gopalan and Aeri, 2001).

In tropical countries adult malnutrition has received much less attention than that of children. The prevalence of adult under nutrition has been high in poor socio economic groups and continues to be an important public health problem in India (Naidu and Rao, 1994).

Nutritional anaemia is common in 50-70 per cent women who took cereal based vegetarian diet because of excessive body needs of iron (NIN, 1984). Usha *et al.* (1990) indicated that anaemia is one of the main causes of maternal mortality. Study conducted by Roy (1991) among the tea garden workers of North Bengal reported iron deficiency anaemia was more frequent among women than male workers. Seralathan *et al.* (1993) observed that 16 per cent of farm women in Coimbatore district suffered from severe anaemia. According to Singh *et al.* (2001) iron deficiency anaemia



is a major health problem resulting in considerable mortality and morbidity in an early age. Rajkumar and Premakumari (1999 and 2000) in their studies among women workers of different occupational sectors in Coimbatore also observed underweight and anaemia.

Ramya and Devaki (2000) in their study among the women construction workers in Thirupathi observed increasing degrees of anaemia associated with deficient intake of iron, vitamin C, protein and energy.

Cherian (1992) and Augustine (1993) observed iron deficiency anaemia among the agricultural labourers and women engaged in stone breaking in Thiruvananthapuram district. Udaya (1996) also reported that 58 per cent of farmwomen had low iron status on the basis of haemoglobin values. A study conducted by Smitha (1999) among women agricultural labourers indicated that only 40 per cent had haemoglobin greater than 12g/dl and the rest had deficient haemoglobin status. Farzana and Manay (2000) and Singh and Baghe (2001) observed nutritional anaemia among women in rural areas of Karnataka.

Study conducted by Mathuravalli *et al.* (2002) among the urban slums of Madhurai district also observed anaemia among women.

Saxena and Taneja (1999) in their studies among the pregnant and lactating women of Tabua district of Madhya Pradesh observed higher rate of morbidity and mortality during child bearing. Latafat *et al.* (2000) found iron deficiency anaemia among dairy and non-dairy families of coastal Andhra. Gopalan (2001) reported anaemia among pregnant women in the state of Orissa, Assam, Meghalaya, Tamil Nadu, Kerala, Punjab and Madhya Pradesh and indicated significant differences with respect to anaemia among the different states.

Iron deficiency anaemia was observed among the rural women of child bearing age in China (liu *et al.*, 1992) and Costa Rica (Rodeguize *et al.* 2000). Iron

deficiency anaemia among the rural pregnant women was observed in North West Ecuador, Ethiopia, Tanzania, Burkina and Mexico by Weiget *et al.* (1992), Haidar *et al.* (1999), Antelman *et al.* (2000), Meda *et al.* (2000), Hinderacher *et al.* (2001) and Perez and Alamaguir (2002) respectively. Anssary *et al.* (1999) observed iron deficiency anaemia among the mothers in the rural areas of Kohrran Abad city.

Sar *et al.* (1991) observed calorie deficiency among 53 per cent of women in the rural households of Maharashtra. Karuna and Prema (1993) observed that 33.33 per cent of women engaged in fish vending in Thiruvananthapuram had different grades of energy deficiency. Udaya (1996) also observed different grades of energy deficiency among the farm women in Thrissur district.

Gupta (1999) reported that greater proportion of female suffer from chronic energy deficiency than males and are associated with progressive impairment in morbidity and function. Farzana and Manay (2000) observed chronic energy deficiency among women in the rural households.

In China rural women had a higher incidence of chronic energy deficiency than their urban counter parts (Ge, 1995). Alam (2001) observed that about 50 per cent of women in rural Bangladesh had chronic energy deficiencies.

Protein energy malnutrition was documented among women of both rural and urban population in India (Harris *et al.* 1990). Sar *et al.* (1991) observed protein deficiency among 30 per cent of women in the rural households of Maharashtra.

Getaburn *et al.* (2001) observed protein energy malnutrition among the rural women in Ethiopia.

Cherian (1992) among the agricultural labourers of Thiruvananthapuram district and Yegammai and Ambili (1992) among the fisher folk families of Alleppy district revealed higher prevalence of vitamin B complex deficiencies among women.

Augustine (1993) observed B complex deficiency symptoms among the women engaged in stone breaking. The prevalence of vitamin B complex deficiency was seen in pregnant women and lactating mothers in both dairy and non dairy farmers in Coastal Andhra (Devi and Sarojini, 2000). Mohapatra *et al.* (2001) observed B complex deficiency signs mainly angular stomatitis, cheilosis, glossitis among the women labourers of Kalahandi district of Orissa.

Christin *et al.* (1995) reported clinical symptoms of vitamin A deficiency among the pregnant women in rural Nepal. The prevalence of inadequate levels of serum retinol levels was observed among the mothers in Brazil (Ramalho *et al.*, 2001).

## 2.5 FACTORS INFLUENCING THE NUTRITIONAL STATUS OF WOMEN

Nutritional status is the condition of health as it is related to the use of food by the body (Robinson, 1975). Malnutrition is a condition when one or two nutrients are less or are in excess in the body (Robinson, 1990 and Begum, 1991). Malnutrition has been described as a biological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients (WHO, 1993).

Poverty is the first source of limitation on the consumption of food by large sections of the population (Swaminathan, 1996 and Singh, 1998). Women's poor health status is directly due to her low social status, unequal intrafamilial distribution of food and unequal provision of health care (Swamy and Vijayalakshmi, 1999).

Diet varies from individual to individual due to variation in the social, economic, demographic status and seasons and the diet has a far reaching influence on health and nutritional status (Rahman and Rao, 2000). According to Rajkumar and Premakumari (2000) women's health and nutritional status are affected by unfavourable socio economic conditions like poverty, literacy, overwork, repeated pregnancies, high infant and maternal mortality rates and ineffective health care

services. They also reported that poor nutritional status among women workers is due to low income, faulty food habits, hazardous work, environment, infections and infestations. According to Yongok (2001) income and education are the most important variables influencing the food and nutrient consumption. The author also opined that individuals with high socio economic status had significantly higher intake of most of the nutrients.

Nayga (1994) observed several factors like urbanisation, region, race, ethnicity, sex, unemployment, food stamp participation, household size, weight, height, age and income as the factors which affect the consumption of certain food groups. Rothenberg *et al.* (1994) in their study observed that food choices and intakes were related to socio economic status and activity of daily living status in the homogeneous population. Roos *et al.* (2001) reported that unemployment and economic difficulties in the family decreased the level of food intake.

Employment and economic improvement of women combined with education, health and social inputs would definitely serve as a motivation for consuming nutritious food (Vijayalakshmi, 1991). According to Hemalatha *et al.* (2000) employment is the best and cheapest guarantee to enhance the nutritional status as it supplements to the household income and paves for better purchasing power.

Variation in the food consumption pattern and nutrient intake is due to the inequalities in income and occupational status (Thimmayamma *et al.*, 1973, Brahman *et al.*, 1987, Bigsten *et al.*, 1992 and Rahman and Rao, 2000). Rose *et al.* (1995) opined that economic factors especially income affect the dietary iron intake.

Income status bears a relation with consumption of pulses, milk, fruits, fats and oils and sugar. Among these food groups fats and milk tended to show sharp differences between the income groups (NNMB, 1996). According to Farzana and Manay (2000) high income households spend more income for protein rich protective foods like pulses, milk, vegetables and fresh foods in their diet. In Hyderabad Rahman

and Rao (2000) indicated that the intake of qualitative foods increased as the income increased. Rahman and Rao (2001) also reported that the low income group families spend 82 per cent of their total income for food while the high and middle income groups spend only 40 and 43 per cent of their total income for food respectively.

Studies conducted among the vulnerable rural segments of Hyderabad, Bangalore and Karnataka indicated more nutritional inadequacy among the lower socio economic groups (Rao *et al.*, 1981, Swamy and Vijayalakshmi, 1999, Farzana and Manay, 2000).

Rao *et al.* (1986) observed that the dietary and nutritional status of urban population groups had a clear cut socio economic differentials with high income group showing higher level of nutrient consumption and better nutrition profile than the other two groups and slum registering the poorest levels.

Behrumram and Deolalikar (1986) opined that the seasonal variations in environmental conditions, food availability, food prices and labour demands in rural areas of developing countries produced considerable variations in food consumption pattern and also in the nutrition and health status of the people. Devadas and Easwaran (1986) opined that food habits of the people depended on availability of food.

According to Brahman *et al.* (1987) and Farzana and Manay (2000) the average dietary consumption of various foods and the nutritional status among the urban groups differed according to their socio economic status. Brahman *et al.* (1987) also indicated that the poor nutritional standards of the slum dwellers in urban area is due to poor food intake and environmental conditions. Kumar (1996) reported that among the rural and urban areas of India the changes in the food consumption pattern is due to the changes in faster urbanization and growth in the economy.

According to Haillu (1990) food habits of subsistence farmers depended mainly on the subsistence cropping system and the seasonalities and perishabilities of certain foods and food products.

Nazmul and Ahmed (1986) opined that socio economic factors like land holding had a positive influence on healthy living of farmers. Tanner (1987) also indicated strong relationship between land holdings and prevalence of malnutrition.

Genecaga and Huddleston (1986) reported that educational level of parents and their knowledge of sound dietary practices were the most important determinant of nutritional status. Alderman and Garcia (1992) reported that raising of the household food consumption had less impact on nutritional status than increasing the education level of mothers.

Among rural households women's time use and opportunities for off farm employment might be the important variables mediating nutritional status of women and children (Ashmore and Curry, 1994 and Ashmore, 1996). Ashmore (1996) reported that commercial live stock production may alter both food intake and the intra household control of nutritional resources.

Thimmayamma (1983), Swaminathan (1986) and Mary (1986) pointed out that persistence of under and malnutrition is largely due to inadequate purchasing power which in turn arises from a low growth rate in livelihood opportunities.

Sundari (1990) pointed out that for women employed as casual labourer, their job inspite of providing greater economic freedom results in greater drudgery and consequently poor nutritional status. The working environment in which women spend a significant part of their functional life has a decisive influence on their health, safety, physical, mental and social well being (Rajkumar and Premakumari, 2000).

Optimum health and work capacity of working women can be achieved and maintained if adequate steps are taken to reduce occupational stresses, improve

their diets and provide adequate occupational health care and nutrition education (Rajkumar and Premakumari, 2000). According to Deshpande *et al.* (2001) nutrition, financial independence and education for women are being stressed as important prerequisites to improve the nutritional status of the community.

## 2.6 ENERGY EXPENDITURE PATTERN OF WOMEN AGRICULTURAL LABOURERS

Energy expenditure forms the basis of energy requirement and the energy costs for different activities could be used for estimating the daily energy expenditure of Indians and explain the lower intakes (Gokhale *et al.*, 2001).

Sathyanarayanan *et al.* (1979) opined that nutrition and food intake are closely related to the efficiency and productivity of workers. Overall energy expenditure on body depend on levels of activity, growth, body composition, diet and metabolic characteristics.

Devadas *et al.* (1974) indicated that energy expenditure of Indians for various activities were meagre. The study conducted by NIN (1996) among housewives in an urban slum indicated that they spent over 50 per cent of their total energy on housework and 16 per cent on child care and reported that unlike men, women's work both household and occupational activities does not lend itself to easy quantification.

Ramamurthy and Belawadi (1966) indicated wide variation in the energy expenditure for the same activity between different subjects when expressed per kilogram body weight, but the energy expended per unit time of activity showed less variation.

Energy expenditure for agriculture labour was found to be 3000 kilo calories (Ramamurthy and Belawadi, 1966). Devadas *et al.* (1974 and 1977) and Longhurt (1984) indicated that poor agricultural workers had a high seasonal variation in energy expenditure.

Studies conducted by Cherian (1992) and Smitha (1999) among the farm women of Thiruvananthapuram district and agricultural labourers of Thrissur district respectively indicated a negative energy balance. Swamy *et al.* (2000) also reported negative energy balance among the women agricultural labourers of Karnataka. Dugarwal and Choudhary (2000) revealed negative energy balance of 378 kilo calories/day among the farm labourers of Agriculture Research Station, Sumerpur. They also indicated that by increasing their energy intake and reducing energy expenditure by labour saving agricultural implements, the labourers will be able to maintain energy balance.

In a study conducted among the working women of Delhi Babu (1989) indicated negative energy balance. Augustine (1993) also reported negative energy balance among the women engaged in stone breaking.

Sharon and Puttaraj (2000) exhibited positive energy balance among the women working in an electronic industry and indicated overweight or obesity of varying degrees among them.

Babu (1989) revealed that working women in Delhi spent 10-12 hours a day for employment and mobility and three or more than three hours for looking after children. Jyothi and Sheela (1992) pointed out that rural Indian women work longer hours and expend more energy in different tasks. Bisht *et al.* (2000) in their study among the women living in the remote village in Uttar Pradesh indicated that women spent maximum energy for household activities followed by agricultural operation and animal care. Singh and Tripathi (2001) in their study about the energy expenditure pattern of women in rural dairy enterprise observed that the rural women spent much of their time and energy on performing various dairy husbandry tasks.

Vasconcellos and Portela (2001) in their study among the Brazilian adults observed a linear relationship between BMI and family energy intake, occupational energy expenditure, per capita family expenditure, sex, age, and left arm circumference.



# **Materials and Methods**

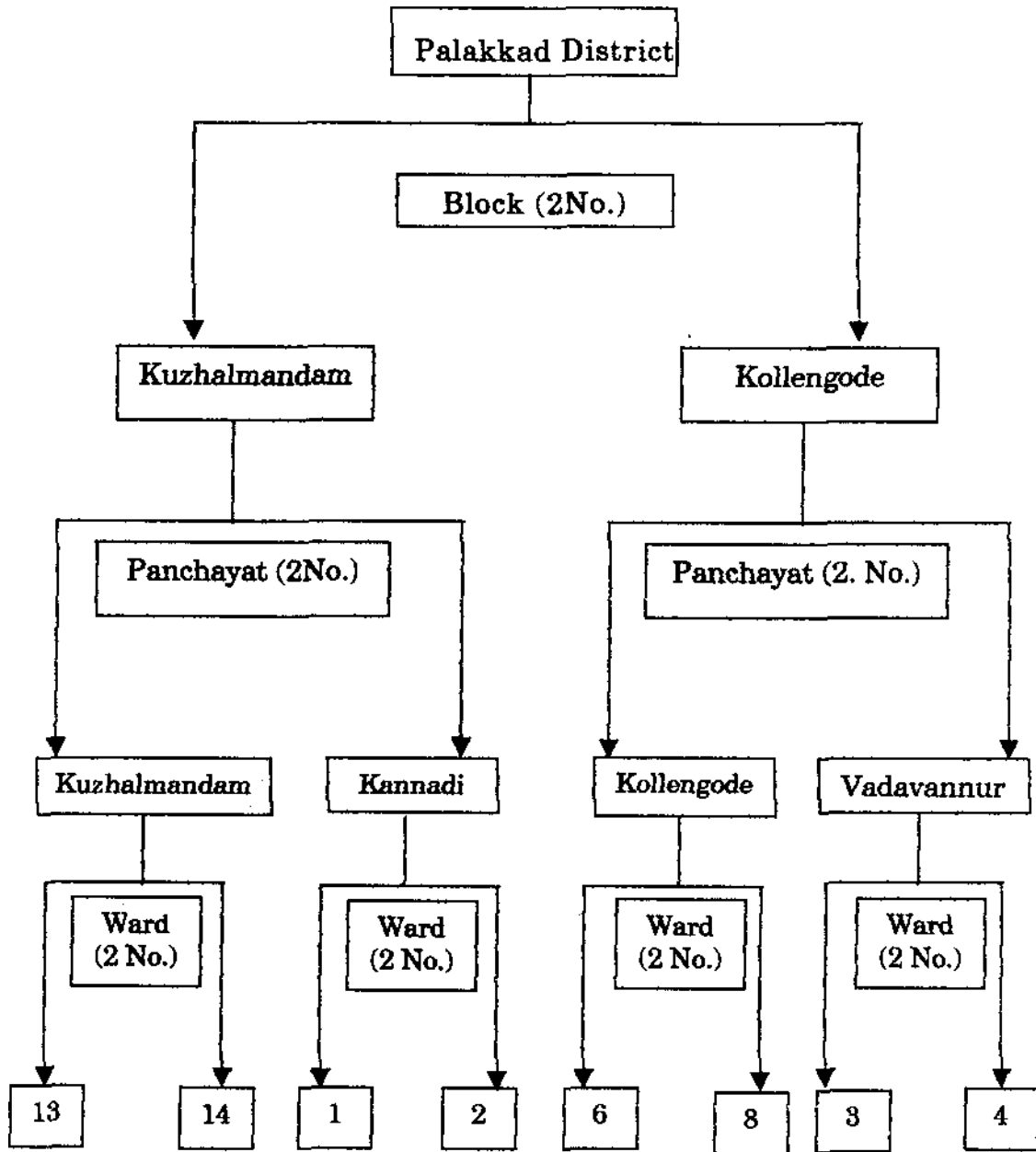
## **MATERIALS AND METHODS**

The procedures and methods adopted during the study entitled "Nutritional profile of women labour in rice cultivation" are explained under the following headings.

1. Locality of the study
2. Selection of the sample
3. Plan of study
4. Methods selected for the study
5. Development of tools and conduct of the study
6. Analysis of the data

### **3.1 LOCALITY OF THE STUDY**

The study was conducted in Palakkad district as this district is having the maximum area under rice cultivation among the districts of Kerala. From Palakkad district two blocks namely Kuzhalmandam and Kollengode with maximum area under rice cultivation were selected. Two panchayaths namely Kuzhalmandam and Kannadi from Kuzhalmandam block and Kollengode and Vadavannur from Kollengode block were randomly selected. From each selected panchayath two wards each were selected at random. Thus, eight wards were selected from Palakkad district for the study. The details of the area selected for the study are given below.



### 3.2 SELECTION OF THE SAMPLE

Woman agricultural labourer in the study is operationally defined as any woman who is earning livelihood through engaging in paid farm work. From the list of women agricultural labourers in the Padasekarams of each selected wards, 15 respondents in the age group of 20-40 years involved in rice cultivation were selected at random. Thus, a total of 120 women

agricultural labourers were selected for the study. For conducting the detailed study one ward was selected at random from the four selected wards of each selected block. Thus there was 30 respondents for the detailed study.

### 3.3 PLAN OF STUDY

Based on the objectives the plan of study was designed.

The plan of action of the study included:

- 3.3.1) A baseline survey to collect the socio-economic conditions of the families.
- 3.3.2) A dietary survey of the families to assess the food consumption pattern
- 3.3.3) A baseline survey to collect details of working condition and working environment of the respondents.
- 3.3.4) Assessment of nutritional status of the respondents through
  - 3.3.4.1) Anthropometric measurements namely height and weight and computing Body Mass Index.
  - 3.3.4.2) Food weighment survey to assess the actual food and nutrient intake (sub sample).
  - 3.3.4.3) Clinical examination to identify the deficiency symptoms (sub sample).
  - 3.3.4.4) Biochemical estimation of blood for haemoglobin (sub sample).
- 3.3.5) Computation of time and energy expenditure pattern for different activities (sub sample).
- 3.3.6) Analysis of data using suitable statistical techniques.

### 3.4 METHODS SELECTED FOR THE STUDY

The data pertaining to the socio economic status and food consumption pattern of the families were collected by direct interview method. The working condition and working environment of the respondents were also collected using the same method.

Interview method is a systematic approach by which a person enters more or less imaginatively into the inner life of a comparative stranger and proceeds systematically and enables quick recording of data. (Devadas and Kulandaivel, 1975 and Bass *et al.* 1979). Interview method was found to be more reliable for the computation of dietary intake of individuals. (Pasricha, 1979, Gupta, 1987, Borreli *et al.* 1989 and Posner *et al.*, 1992).

To assess the nutritional status of the respondents, following methods were employed.

1. Recording of anthropometric measurements
2. Monitoring actual food and nutrient intake.
3. Conducting clinical examination
4. Estimating the haemoglobin level of blood.

Anthropometry had been accepted as an important tool for assessing the nutritional status. (Jelliff 1966, Weisell and Francois, 1982, Cooper and William, 1982, McLaren *et al.*, 1984, Vijayaraghavan, 1987, Vijayalakshmi *et al.*, 1987, Sharma and Kalia, 1990, Reddy *et al.*, 1993 and Rao and Vijayaraghavan, 1996). Rao and Vijayaraghavan (1996) also pointed out that anthropometry can help in the assessment of sub clinical stages of malnutrition and it has

been recognized as a reliable tool to identify nutritionally vulnerable groups.

Bodyweight is the most ideal measure for assessing the nutritional status (Swaminathan, 1987). A change in the body weight may be the result of change in the health of an individual, change in dietary supplies or even changes in one's physical activity. According to Venkitalakshmi and Peramma (2000) body weight is a sensitive indicator of nutritional status.

Gopaldas and Seshadri (1987) reported that the extend of height deficit in relation to age as compared to regional standards could be regarded as a measure of malnutrition. Among the environmental factors which influence the height of an individual nutrition and morbidity are very important because inadequate dietary intake or infections reduce nutrient availability at cellular level leading to growth retardation and stunting (Rao and Vijayaraghavan, 1996)

Body Mass Index (BMI) expressed as the ratio of weight (kg) to height (m) square is a good indicator of nutritional status of adults (NIN, 1991) and (Brahman, 1999).

Hence, in the present study anthropometric indices namely weight and height of all respondents were recorded to assess their nutritional status.

Diet surveys constitute an essential part of any complete study of nutritional status of an individual or groups and provides essential information on nutrient intake levels, source of nutrition, food habits and attitudes (Gopaldas and Seshadri, 1987).

Food consumption survey provides data on the type and amount of foods consumed by a representative sample of survey population (Schofield, 1985).

Among the diet survey methods commonly employed for determining dietary intake of population, the conventional seven day weighment method had been considered as the most reliable (Swaminathan *et al.*, 1967 and Rao, 1975). Rao (1975) also pointed out that any single day or two day weighment method would be as efficient a tool as the seven days. Weighment method of diet survey according to Rao (1975) and Gore *et al.* (1977) could give accurate values of dietary intake than recall method. According to Tilve (1978) individual intake could be measured accurately only by actual weighing of food items consumed.

Thimmayamma and Rau (1981) opined that food weighment survey is laborious and time consuming and dependent on availability of food at home. According to Mari (1985) actual food consumption within the family by one day weighment could be better mentioned in micro samples.

Devadas and Easwaran (1986) observed food weighment method as the most reliable method to assess the actual food intake of an individual. Weighment of the food items before consumption and oral questionnaire to recall the food items consumed already are the well utilized methods of food consumption surveys (Rahman and Rao, 2000).

Hence, in this study one day weighment survey was conducted among the sub samples to determine their actual food and nutrient intake.

Clinical examination is an important, practical and sound method of assessing the nutritional status of a community (Jelliffe, 1966 and Kamath, 1986). Clinical examination is the most important part of nutritional assessment since it provides direct information on the signs and symptoms of dietary deficiencies prevalent among people (Swaminathan, 1986). Rao and Vijayaraghavan (1996) pointed out that the clinical examination reveal the anatomical changes due to malnutrition that can be diagnosed by naked eye. In the present study clinical examination of thirty women labourers was conducted to assess the signs and symptoms associated with nutritional deficiencies.

Biochemical estimation represented the most objective assessment of the nutritional status of an individual, providing pre or subclinical information (Sausberlich *et al.*, 1977). Daphna (1979) pointed out that biochemical tests were of utmost importance in the assessment of individual nutritional status. Estimating the prevalence of anaemia depends upon the methods used for assessing haemoglobin concentration (Singh *et al.*, 2001). The author also reported that for all degrees of anaemia cyanmethaemoglobin method will give correct values of haemoglobin. Hence, in the present study biochemical estimation of blood for haemoglobin was carried out among the sub samples.

Energy requirement can be assessed in a better way in terms of energy expenditure rather than energy intake (ICMR, 1990 and Gokhale *et al.*, 2001). Hence, the energy expenditure for different activities for a day was computed among the sub sample.



### 3.5 DEVELOPMENT OF TOOLS AND CONDUCT OF THE STUDY

#### **3.5.1 The methodology framed for the survey of different socio economic profiles were detailed below:**

To collect information on socio economic background and dietary habits of the families and to collect information on the working pattern of the respondents two interview schedules were prepared. The schedule to assess the socio economic status comprised of information on religion, caste, type of family, family size, composition of the family, educational status, occupational status, total land holdings, cultivation of crops, domestication of animals, monthly income, details of loan taken, monthly expenditure pattern, housing conditions, use and source of drinking water, use and source of fuel, use of health care facilities, social participation and working pattern and activities involved in the field. The percentage of women respondents in each profile was worked out.

##### ***3.5.1.1 Operationalisation and measurement of the socio-economic profile characters***

###### **i) Religion and Caste**

In the present study, the respondents were categorised based on the religion in which they belong as Hindu, Muslim or Christian. The categories of caste, under the above listed religion were also collected.

## ii) Type of family

Type of family was operationally defined as the type of family to which the respondents belong. Two types of family were considered – nuclear family and joint family.

## iii) Family size

Family size was categorised into four groups based on the number of members present in the family. The families were categorised as of 1 - 3, 4-6 and 7-9 members.

## iv) Educational status

Educational qualification was defined as the formal education received by the women labourers. The educational status of the family members (adults, respondents and children) were measured based on their completion of education as lower primary, upper primary, high school, college and illiterate.

## v) Occupational status

Occupational status of the family members were measured based on their livelihood sources.

## vi) Size of land holdings

Extend of land owned by the labourer families were measured in cents and was categorised into four groups <5, 5-10, 10-15, 15-20 cents.

### vii) Monthly income

The income level was measured in total amount of rupees earned by the family through the earnings of all members and was grouped as <Rs. 500.00, Rs. 500.00 - Rs. 999.00, Rs. 1000.00 - Rs. 1499.00, Rs. 1500.00 - Rs. 1999.00, Rs. 2000.00 - Rs. 2499.00, Rs. 2500.00 - Rs. 2999.00, Rs. 3000.00 - Rs. 3499.00 and above.

### viii) Details of loan taken

The number of families were calculated based on the source of loan received and the purpose. Source of loan were classified as co-operative society and bank and the purpose of loan were classified as for agriculture, house construction, marriage, business, buying vehicle and domestic animals.

### ix) Monthly expenditure pattern

Based on the percentage of expenditure for different purposes such as food, clothing, shelter, transport, recreation, education, electricity, health, fuel, water, furniture, personal expenses and savings The families were grouped into 8 groups as no expenditure, < 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, 51 - 60 and 61 - 70.

### x) Housing conditions

Regarding the housing conditions number of families were calculated by grouping the families based on their type of house, number of rooms, roofing material, type of wall, kitchen facilities,

source of drinking water, lavatory facilities, drainage facilities, electricity facilities, recreation<sup>ا</sup> facilities and transport facilities.

#### xi) Working Pattern

The following details regarding the working pattern were observed through frequency and percentage of work, working time, working condition, work performance, work during different seasons, agricultural implements used and wage of the respondents.

### **3.5.2 The methodology framed for the details of food consumption pattern were detailed below:**

The schedule to find out the food consumption pattern of the families covered food expenditure pattern, frequency of use of various food items, meal pattern, cooking vessels used, cooking methods, preservation and storage methods adopted, diet during different stages of life, physiological conditions and diseases and believes related to food.

#### ***3.5.2.1 Operationalisation and measurement of the details of food consumption pattern***

##### **i) Food expenditure pattern**

Based on percentage of expenditure for different food items like cereals, pulses, other vegetables, roots and tubers, green leafy vegetables, fruits, milk and milk products, meat, fish, egg, fats and oils, nuts and oil seeds, sugar and jaggery and spices and condiments, the families were grouped as no expenditure, < 5per cent, 5 – 10 per cent, 10 – 20 per cent, 20 – 30 per cent, 30 – 40 per cent, >40 per cent.

## ii) Frequency of intake of various foods

The number of families were worked out based on the frequency of intake of various food items utilized by them such as daily, weekly four, weekly thrice, weekly twice, weekly once, monthly, occasionally and never.

Based on the intake of various food items by the families the food items were classified as most frequently used, medium frequently used and less frequently used.

## iii) Meal pattern

Details on meal pattern were observed with regard to meal planning, number of meals per day, time schedule and food distribution.

## iv) Cooking pattern

Based on time of cooking (once or twice), cooking vessels used (steel, aluminium or earthen pot) and cooking devices used (ordinary hearth or kerosene stove), frequency and percentages were worked out for the sample.

## v) Cooking methods

Cooking methods were categorised as boiling, straining, absorption and shallow fat frying. Depending upon the cooking method adopted by the families for different food items, the number of families and percentage were calculated. Methods followed for preservation of foods also were recorded.

vi) Foods given during special conditions

Special conditions were categorised as infancy, preschool, adolescent, pregnancy, lactation and old age. Based on the type of food used by the families during these special conditions, the number of families were observed and analysed.

vii) Foods prepared during special occasions

Details of the food items used by the families during occasions like marriage, birthday and death ceremony were calculated as frequency and percentage.

viii) Diet during diseases

The diet of the respondents during the common diseases were recorded and analysed.

ix) Beliefs related to food

Beliefs associated with food intake were also collected from the respondents.

Both these schedules were pretested before field application and are given in Appendix I and II respectively. The socio economic status and food consumption pattern of all the selected families and the working pattern of all the respondents were collected using these schedules.

Anthropometric measurements like weight and height of the selected respondents were taken as suggested by Jelliffe (1966)

and Rao and Vijayaraghavan (1996). Using the height and weight BMI was computed using the formula

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

Clinical examination was conducted among 30 women labourers with the help of a qualified physician and the schedule used for this purpose is given in Appendix III.

Blood haemoglobin level of the subsample was estimated using cyanmethaemoglobin method suggested by NIN (1983).

One day food weighment survey was conducted among the subsamples and the schedule used to assess the actual food intake is given in Appendix IV. The nutrients available from the food consumed were computed using the food composition table (Gopalan *et al.*, 1989).

Energy expenditure for different activities was computed among the subsamples. Using the prediction equation proposed by ICMR expert group for Indians (ICMR, 1990), the value of Basal Metabolic Rate (BMR) in terms of kilocalories was computed for each individual. The prediction equation for women in the age group of 18-30 years is  $14 \times \text{body weight (kg)} + 471$  and 30-60 years is  $8.3 \times \text{body weight (kg)} + 788$ . By substituting body weight of the respondents, BMR in terms of kilocalories per day was computed. Using the BMR units calculated by activity breakup method, for moderate worker for sleep (1.0), occupational (2.8) and non occupational (2.0) activities the energy expenditure of the respondents for a day was computed by multiplying the BMR with the mean BMR unit of 1.9.

The total energy expenditure was compared with the energy intake of the respondents for a day obtained from one day food weighing survey to find out the energy balance.

### 3.6 STATISTICAL ANALYSIS

The various statistical techniques used to analyse the observations are percentage analysis, 't' test, analysis of variance and correlation.



# Results

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## **RESULTS**

The results of the study on 'nutritional profile of women labour in rice cultivation' are presented under the following headings.

- 1) Socio economic profile of the families.
- 2) Food consumption pattern of the families.
- 3) Nutritional status of the respondents.
- 4) Working pattern of the respondents.
- 5) Energy intake and expenditure of the respondents.

### **4.1 SOCIO ECONOMIC PROFILE OF THE FAMILIES**

The socio economic profile of the families were studied with special reference to their religion, caste, type of family, family size, family system, composition of the family, educational status, occupation status, total land holdings, cultivation of crops, domestication of animals, monthly income, details of loan taken, monthly expenditure pattern, housing conditions, use and source of drinking water, use and source of fuel, use of health care facilities and social participation.

#### **4.1.1 Religion, caste, type of family and family size**

Details of religion, caste, type of family and family size are presented in Table 1. The table reveals that most of the families (99.17%) were Hindus and the remaining belonged to Muslim community.

Out of the total families surveyed 34.17 per cent belonged to scheduled caste while the rest belonged to other backward communities. The table also showed predominance of nuclear type families which constituted 80 percent and the remaining were joint families.

Regarding the family size it was found that as much as 64.17 per cent of the families were in the size group of four to six and 26.67 per cent had upto three members. Rest of the families (9.16%) had above six members.

Table 1. Details of religion, caste, type of family and family size  
n=120

Sl. No.	Category	f	%
1	Religion		
	Hindu	119	99.17
	Muslim	1	0.83
2.	Caste		
	Other back ward caste	79	65.83
	Scheduled caste	41	34.17
3.	Type of family		
	Joint	24	20.00
	Nuclear	96	80.00
4.	Family size		
	1-3	32	26.67
	4-6	77	64.17
	7-9	11	9.16

Among the families, 88.33 per cent were male headed while the rest were female headed either due to the expiry of the husband or due to divorce.

All the families followed patriarchal family system.

#### 4.1.2 Composition of the families

It was found that as much as 52.87 per cent of the total population was in the age group of 20 to 50 years and composed of 23.18 per cent male and 29.7 per cent female members. The people above 50 years constituted 9.58 per cent and children below 10 years was 13.98 per cent of the total population (Table 2).

Table 2 Distribution of family members on the basis of age and sex

Sl. No.	Category Age (Year)	Number		
		Male n=270	Female n=252	Total n=522
1	>60	6 (1.15)	13 (5.16)	19 (3.64)
2	50-60	25 (9.26)	6 (2.38)	31 (5.94)
3	40-50	44 (8.43)	30 (5.75)	74 (14.18)
4	30-40	42 (8.05)	63 (12.07)	105 (20.12)
5	20-30	35 (6.70)	62 (11.88)	97 (18.58)
6	10-20	89 (17.05)	34 (6.51)	123 (23.56)
7	0-10	29 (5.56)	44 (8.43)	73 (13.98)

Number in parentheses are percentages

#### 4.1.3 Educational status of family members

The educational status of family members above 18 years of age is presented in Table 3. Among the 161 male and

178 female members above 18 years of age 39.75 per cent male and 21.91 per cent females were illiterate. It can be seen that the percentage of illiterates increased with increase in age group and in the highest age group of above 55 years 88.89 per cent of male and 87.5 per cent females were illiterate. About 15.53 per cent male and 32.59 per cent female members had studied upto high school level and only 1.24 per cent of male and 0.56 per cent of female had received college level of education. None of the male and female members above 45 years of age had attained college level of education.

Table 3. Educational status of family members

n=339

Educational status	Age in years						Total	
	18-45		45-55		>55			
	M	F	M	F	M	F	M	F
Lower primary	37 (31.63)	41 (25.95)	9 (25.71)	4 (100)	1 (11.11)	2 (12.5)	47 (29.19)	47 (26.40)
Upper primary	20 (17.09)	33 (20.89)	3 (8.57)	-	-	-	23 (14.29)	33 (18.54)
High school	20 (17.09)	58 (36.71)	5 (14.29)	-	-	-	25 (15.53)	58 (32.59)
College	2 (1.71)	1 (0.63)	-	-	-	-	2 (1.24)	1 (0.56)
Illiterate	38 (32.48)	25 (15.82)	18 (51.43)	-	8 (88.89)	14 (87.5)	64 (39.75)	39 (21.91)
Total	117 (100)	158 (100)	35 (100)	4 (100)	9 (100)	16 (100)	161 (100)	178 (100)

Number in parentheses are percentages

#### 4.1.4 Educational status of respondents

Details regarding the educational status of the respondents (Table 4) revealed that about 30 per cent each of the

respondents had attained high school level and lower primary level of education while 22.5 per cent had studied upto upper primary level. Only a minority (0.83 %) of the respondents had studied upto college level and the rest (16.7 %) were illiterates.

**Table 4. Educational status of respondents**

n=120

Sl. No.	Category	n	%
1	Illiterate	20	16.67
2	Lower primary	36	30.00
3	Upper primary	27	22.50
4	High school	36	30.00
5	College	1	0.83

#### **4.1.5 Educational status of children and adolescents**

Details regarding the educational status of children and adolescents are given in Table 5. It was observed that none of the children below four years were attending either schools or balwadies. About 26.6 per cent of boys and 18.91 per cent of girls had attained lower primary education where as 32.11 per cent of boys and 37.83 per cent girls had upper primary education. It could be seen that about 13.76 per cent boys and 13.51 per cent girls discontinued their studies. Only 11 per cent of boys and 22.97 per cent of girls had high school level of education.

Table 5. Educational status of children and adolescents n=183

Sl. No.	Category	0-4 years		5-9 years		10-12 years		13-15 years		16-17 years		Total	
		B	G	B	G	B	G	B	G	B	G	B	G
1	Not Started Studies	18 (100)	5 (100)	-	-	-	-	-	-	-	-	18 (16.52)	5 (6.76)
2	Lower Primary	-	-	12 (85.71)	7 (100)	4 (22.22)	3 (25)	-	-	13 (35.14)	4 (15.39)	29 (26.61)	14 (18.92)
3	Upper Primary	-	-	-	-	7 (38.89)	6 (50)	11 (50)	7 (29.17)	17 (45.95)	15 (57.69)	35 (32.11)	28 (37.84)
4	High School	-	-	-	-	-	-	8 (36.36)	12 (50)	4 (10.81)	5 (19.23)	12 (11)	17 (22.97)
5	Drop outs	-	-	2 (14.29)	-	7 (38.89)	3 (25)	3 (13.64)	5 (20.83)	3 (8.1)	2 (7.69)	15 (13.76)	10 (13.51)
	Total	18 (100)	5 (100)	14 (100)	7 (100)	18 (100)	12 (100)	22 (100)	24 (100)	37 (100)	26 (100)	109 (100)	74 (100)

Number in parentheses are percentages

### 4.1.6 Occupational status of family members

The occupational status of the family members are presented in Table 6. Out of the total population above 18 years, 79.35 per cent were engaged as agricultural labourers which included 77.63 per cent male and 80.90 per cent female members. Among this group majority of male and female members were from the age group of 18 to 45 years which included about 82 per cent in both groups. More than 11 per cent were working as coolies other than agricultural labourers and only a minority of 1.18 per cent and 0.59 per cent were engaged in private job and business respectively.

Table 6. Occupational Status of family members n = 339

Sl. No.	Category	Age in years						Total	
		18-45		45-55		>55		M	F
		M	F	M	F	M	F		
1	Private job	2 (1.71)	2 (1.27)	-	-	-	-	2 (1.24)	2 (1.12)
2	Business	1 (0.85)	-	1 (2.86)	-	-	-	2 (1.24)	-
3	Coolie	18 (15.39)	14 (8.86)	6 (17.14)	-	-	-	24 (14.91)	14 (7.87)
4	Agricultural labourers	96 (82.05)	130 (82.28)	25 (71.43)	4 (100)	4 (44.44)	10 (62.5)	125 (77.64)	144 (80.90)
5	No work	-	12 (7.59)	3 (8.57)	-	5 (55.56)	6 (37.5)	8 (4.97)	18 (10.11)
	Total	117 (100)	158 (100)	35 (100)	4 (100)	9 (100)	16 (100)	161 (100)	178 (100)

Number in parentheses are percentages



#### 4.1.7 Marital status of respondents

Table 7 reveals that 88.33 per cent of the respondents were married and 1.67 per cent were unmarried and the rest (10%) were widow.

Table 7. Marital status of respondents n=120

Sl. No.	Category	n	%
1	Married	106	88.33
2	Unmarried	2	1.67
3	Widow	12	10.00

#### 4.1.8 Availability of land

The details on the availability of land and the way it was received by the family are given in table 8a and 8b. Most of the family members of the respondents (90 %) owned upto 10 cents of land while 6.67 per cent had 10 to 15 cents of land as their own. Rest of the families owned land ranging from 15 to 20 cents.

About 68.33 per cent of the families who had land inherited it from their parents where as 27.5 per cent of the families purchased the land.

Table 8a. Details on the availability of land n=120

Sl. No.	Area (Cents)	f
1	<5	71 (59.17)
2	5-10	37 (30.83)
3	10-15	8 (6.67)
4	15-20	4 (3.33)

Number in parentheses are percentages

Table 8b. Details on how the land was received by the families

n=120

Sl. No.	Category	f
1	Purchased	33 (27.5)
2	Inherited	82 (68.33)
3	Purchased and inherited	5 (4.17)

Number in parentheses are percentages

#### 4.1.9 Cultivation of crops

Details regarding the cultivation of food crops are given in Table 9. From the table it is clear that though, all the families had their own land only 14.17 per cent of the families cultivated crops like coconut, banana, mango, tamarind etc. Only 1.67 per cent of the families cultivated paddy. Out of the total families who cultivated crops only 23.53 per cent received income from the crops.

Table 9. Details about cultivation of crops n=120

Crops cultivated	f	%
Coconut	5	4.17
Tamarind	3	2.50
Mango	2	1.67
Paddy	2	1.67
Banana	1	0.83
Jack	1	0.83
Coconut, mango, jack, paddy	2	1.67
Coconut, mango	1	0.83
No crops	103	85.83
<b>Total</b>	<b>120</b>	<b>100</b>
Getting income from crop cultivation	4	23.53
No income	13	76.47
<b>Total</b>	<b>17</b>	<b>100</b>

#### 4.1.10 Kitchen garden and domestication of animals

It was observed that none of the families surveyed had a kitchen garden in their household. Regarding the domestication of animals it was seen that about 50 per cent of the families had hen and they used egg for their own consumption. Out of this only 14.29 per cent of the families received income from the domestic animals. The families who had cow used the cow dung for their own agricultural purposes.

Table 10a. Details regarding the domestication of animals n=42

Sl. No.	Category	f	%
1	Cow	2	4.76
2	Goat	11	26.19
3	Hen	21	50
4	Cow & Hen	2	4.76
5	Goat & Hen	6	14.29

Table 10b Details regarding income from the domestication of animals

Sl. No.	Category	f	%
1	Received Income	6	14.29
2	No income	36	85.71
	Total	42	100

#### 4.1.11 Monthly income of the families

In Table 11 the details regarding the monthly income of the families are presented. About 87.5 per cent of the families had below Rs. 2000/- as monthly income while in the rest of the families (12.5%) the income ranged between Rs. 2000 to Rs.4000 per month.

Table 11. Monthly income of the family n=120

Sl. No.	Category (Rs)	f	%
1	<500	3	2.50
2	500-999	38	31.67
3	1000-1499	35	29.17
4	1500-1999	29	24.16
5	2000-2499	10	8.33
6	2500-2999	3	2.50
7	3000-3499	1	0.83
8	>3500	1	0.83

#### 4.1.12 Indebtedness

Regarding the indebtedness of the families, it was found that only 25 per cent of the families borrowed money on loan basis either from co operative society or bank. The details of the source, purpose and amount of loan received by the families are presented in Table 12. It was found that out of the 30 families who took loan, 33.33 per cent took it for marriage of their children while 26.67 per cent took loan for construction of house and the rest for different purposes like agriculture (6.67 %), purchase of vehicle (6.67%) and purchase of domestic animals (13.33 %). About 50 per cent of the families took an amount ranging from Rs. 10,000 to 30,000 for these purposes.

Table 12. Details of loan taken by the families n=120

Sl. No.	Category	f	Purpose	f	Amount (Rs)	f
1	Cooperative society	3 (2.5)	Agriculture	2 (6.67)	<10000	14 (46.67)
2	Bank	27 (22.5)	House construction	8 (26.67)	10000- 20000	12 (40)
3	Nil	90 (75)	Marriage	10 (33.33)	20000- 30000	3 (10)
			Business	4 (13.33)	40000- 50000	1 (3.33)
			Vehicle	2 (6.67)		
			Domestic animals	4 (13.33)		
	Total	120		30		30

#### **4.1.13 Monthly expenditure pattern**

Details regarding the monthly expenditure pattern of the families for various items like food, clothing, shelter, transportation, recreation, electricity, health, fuel, water, furniture, luxury and personal needs and savings are presented in Table 13. It can be seen that 54.17 per cent of families spent 50 to 70 per cent of their monthly income for food and 38.33 per cent spent 30 to 50 per cent while the rest (7.5 %) spent less than 30 per cent of their monthly income for food. It was also observed that majority of the families spent less than 20 per cent of their monthly income for other purposes like clothing, shelter, transportation, recreation, health, fuel and personal needs like purchase of alcohol, beedi and cigarettes. About 48 per cent and 49 per cent of the families did not spend money for education and electricity respectively. None of the families spent money for water and furniture.

It was also observed that none of the families had the habit of saving money.

Table 13. Details of monthly expenditure pattern of the families n=120

Percentage of expenditure	Food	Clothing	Shelter	Transport	Recreation	Education	Electricity	Health	Fuel	Water	Furniture	Personal	Savings
No expenditure	-	-	-	-	-	57 (47.5)	59 (49.17)	-	-	120 (100)	120 (100)	87 (72.5)	120 (100)
<10	-	104 (86.67)	120 (100)	73 (60.83)	101 (84.17)	33 (27.5)	60 (50)	74 (61.67)	42 (35)	-	-	16 (13.33)	-
11-20	-	16 (13.33)	-	44 (36.67)	17 (14.17)	25 (20.83)	1 (0.83)	27 (22.5)	45 (37.5)	-	-	13 (10.84)	-
21-30	9 (7.5)	-	-	2 (1.67)	2 (1.66)	5 (4.17)	-	14 (11.67)	24 (20)	-	-	4 (3.33)	-
31-40	17 (14.17)	-	-	1 (0.83)	-	-	-	4 (3.33)	8 (6.67)	-	-	-	-
41-50	29 (24.16)	-	-	-	-	-	-	1 (0.83)	1 (0.83)	-	-	-	-
51-60	42 (35)	-	-	-	-	-	-	-	-	-	-	-	-
61-70	23 (19.17)	-	-	-	-	-	-	-	-	-	-	-	-

Number in parentheses are percentages

#### **4.1.14 Housing conditions**

Details of the housing conditions of the families are presented in Table 14. It was revealed that majority of the families (98.33 %) had their own houses and nearly 80 per cent of the houses had upto three rooms while the rest of the houses had four or five rooms. Out of the 120 families surveyed 95.83 per cent of the families were residing in houses with tiles as the roofing material where as 4.17 percent of the families were with thatched roof, 63.33 per cent had brick as the wall material where as 36.67 percent had houses with mud built wall.

Most of the families (85.83 %) had separate kitchen in their houses.

None of the families had their own well as the source of drinking water and most of them depended on public tap or well for this purpose.

Regarding the lavatory facilities it could be seen that majority had no lavatory facilities in their houses and none of the houses had proper drainage facilities also. Only 37.5 per cent of the families had proper transport facilities in their locality and 61.67 per cent had recreational facilities in their houses.



Table 14 Housing conditions of the families n=120

Sl. No.	Facilities	f	%
1	Type of house		
	own	118	98.33
	Rented	2	1.67
2	Number of rooms		
	1	5	4.17
	2	28	23.33
	3	63	52.50
	4	18	15.00
	5	6	5.00
3	Roofing material		
	Thatched	5	4.17
	Tiled	115	95.83
4	Type of wall		
	Mud built	44	36.67
	Brick made	76	63.33
5	Kitchen facilities		
	Separate kitchen	103	85.83
	No separate kitchen	17	14.17

Sl. No.	Facilities	f	%
6	Source of drinking water		
	Public tap	57	47.5
	Public well	8	6.66
	Public tap and well	45	37.5
	Near by home	10	8.34
7	Lavatory facilities		
	Own latrine	48	40
	Open field	72	60
8	Drainage facilities		
	Open drainage	79	65.83
	No drainage	41	34.17
9	Electricity facilities		
	Present	67	55.83
	Absent	53	44.17
10	Recreational facilities		
	Radio and Transistor	74	61.67
	Radio	46	38.33
11	Transport facilities		
	Present (Cycle)	45	37.50
	Absent	75	62.50

#### 4.1.15 Type of fuel

It was found that all the households used firewood as the major source of fuel (Table 15). Nearly 88.33 per cent of the families used only wood and 7.5 per cent of the families used wood and kerosene. It could be seen that none of them used LPG. About 76.67 per cent of the families collected wood from their surroundings and the rest purchased from outside.

Table 15. Details regarding type of fuel n=120

Sl. No.	Type	f	%
1.	Only firewood	106	88.33
2.	Firewood and kerosene	9	7.50
3.	Firewood, kerosene and saw dust	3	2.50
4.	Firewood and saw dust	2	1.67
	Source of fuel	f	%
1.	Collected from surroundings	92	76.67
2.	Purchased	28	23.33

#### 4.1.16 Details of health care facilities

It was revealed that majority (77.5 %) of the families depended on primary health centre of the locality, private hospital as well as the district hospital for their medical care. About 21 per cent of the families depended only on private hospital while a minority of 1.67 per cent depended on the primary health centre of their locality for medical services. The details are provided in Table 16.

Table 16. Health care facilities in the locality n=120

Facilities	f	%
Primary health centre	2	1.67
Private hospital	25	20.83
Primary health centre, private hospital and government hospital	93	77.50

#### 4.1.17 Epidemics prevalent in the locality

It was observed that nearly 62.5 per cent of the families were affected with various contagious diseases like mumps, measles, or chicken pox during the previous one year. The details are given in Table 17.

Table 17. Details of epidemics prevalent during the last one year n=120

Epidemic	f	%
1) Mumps	30	25
2) Measles	30	25
3) Chicken pox	15	12.5
4) Nil	45	37.5

#### 4.1.18 Social participation

Table 18 furnishes details of social participation of the respondents in different organisations. It is clear that the extend of participation in social activities was only 40.84 per cent among

the respondents and they were members of Ayalkoottam or Gramasabha. Among these members only 40.82 per cent attended the meeting regularly.

Table 18. Details regarding social participation of the respondents n=120

Sl. No.	Details	n	%
a)	Member of		
i)	Ayalkoottam	17	14.17
ii)	Gramasabha	32	26.67
iii)	Not a member of any organisation	71	59.16
b)	Frequency of attending the meeting n=49		
i)	Regularly	20	40.82
ii)	Most of the meetings	12	24.49
iii)	Sometimes	17	34.69

## 4.2 FOOD CONSUMPTION PATTERN OF THE FAMILIES

The food consumption pattern of the families was assessed with respect to the food habits, staple food, food expenditure pattern, frequency of use of different food items, meal pattern, cooking vessels used, cooking methods, preservation and storage practices, foods given during special conditions, occasions and diseases.

### 4.2.1 Food habit

All the families surveyed were found to be non-vegetarians and rice was their staple food.

### 4.2.2 Food expenditure pattern

Table 19. Distribution of families by monthly expenditure pattern for food

Food item	No expenditure	<5%	5-10%	10-20%	20-30%	30-40%	>40%	Total
Cereals	-	1 (0.83)	4 (3.33)	15 (12.5)	66 (55)	34 (28.34)	-	120 (100)
Pulses	-	118 (98.33)	2 (1.67)	-	-	-	-	120 (100)
Other vegetables	-	108 (90)	12 (10)	-	-	-	-	120 (100)
Roots and tubers	-	119 (99.17)	1 (0.83)	-	-	-	-	120 (100)
Green leafy vegetables	120 (100)	-	-	-	-	-	-	120 (100)
Fruits	120 (100)	-	-	-	-	-	-	120 (100)
Milk and milk products	28 (23.33)	84 (70)	8 (6.67)	-	-	-	-	120 (100)
Meat	-	109 (90.83)	11 (9.17)	-	-	-	-	120 (100)
Fish	-	118 (98.33)	2 (1.67)	-	-	-	-	120 (100)
Egg	-	120 (100)	-	-	-	-	-	120 (100)
Fats and oils	-	103 (85.83)	17 (14.17)	-	-	-	-	120 (100)
Nuts and oil seeds	-	120 (100)	-	-	-	-	-	120 (100)
Sugar and jaggery	-	108 (90)	12 (10)	-	-	-	-	120 (100)
Spices and condiments	-	120 (100)	-	-	-	-	-	120 (100)

Number in parentheses are percentages

From Table 19, it is clear that about 55 per cent of the families spent 20-30 per cent of their food expenses on cereals

while 28.34 per cent spent about 30-40 per cent. Majority of the families spent less than five per cent of their expenditure on food for the purchase of pulses (98.33 %), other vegetables (90%), roots and tubers (99.17%), milk and milk products (70%), meat (90.83%), fish (98.33%), egg (100%), fats and oils (85.83%), nuts and oilseeds (100%), sugar and jaggery (90%) and spices and condiments (100%). None of the families spent money for the purchase of green leafy vegetables and fruits.

#### **4.2.3 Frequency of use of food items**

The details of frequency of use of various food items by the families are presented in Table 20. The table shows that all the families used cereals, fat and oils, sugar and jaggery and spices and condiments in their daily diet. None of the families included pulses, roots and tubers and other vegetables daily and they used these items on a weekly basis. It was also seen that all the families used green leafy vegetables and fruits only occasionally and majority of the families included meat (89.17%) and egg (83.33%) occasionally.

Table 20. Frequency of intake of various foods

Food items	D	W <sub>4</sub>	W <sub>3</sub>	W <sub>2</sub>	W <sub>1</sub>	M	O	N	Total
Cereals	120 (100)	-	-	-	-	-	-	-	120 (100)
Pulses	-	-	-	59 (49.17)	61 (50.83)	-	-	-	120 (100)
Green leafy vegetables	-	-	-	-	-	-	120 (100)	-	120 (100)
Other vegetables	-	21 (17.5)	62 (51.67)	-	37 (30.83)	-	-	-	120 (100)
Roots and tubers	-	-	2 (1.66)	44 (36.67)	74 (61.67)	-	-	-	120 (100)
Fruits	-	-	-	-	-	-	120 (100)	-	120 (100)
Milk and milk products	42 (35)	-	-	-	-	-	50 (41.67)	28 (23.33)	120 (100)
Meat	-	-	-	-	-	13 (10.83)	107 (89.17)	-	120 (100)
Fish	-	-	-	-	25 (20.83)	39 (32.5)	56 (46.67)	-	120 (100)
Egg	-	-	-	-	2 (1.67)	18 (15.0)	100 (83.33)	-	120 (100)
Fats and oils	120 (100)	-	-	-	-	-	-	-	120 (100)
Nuts and oil seeds	-	-	120 (100)	-	-	-	-	-	120 (100)
Sugar and jaggery	120 (100)	-	-	-	-	-	-	-	120 (100)
Spices and condiments	120 (100)	-	-	-	-	-	-	-	120 (100)

Number in parentheses are percentages

D- Daily M-Monthly

W- Weekly O- Occasionally

N-Never



Table 21. Frequency score (%) on different food items

Food items	Score
Cereals	100.00
Pulses	56.15
Green leafy vegetables	25.00
Other vegetables	69.49
Roots and tubers	54.99
Fruits	25.00
Milk and milk products	48.33
Meat	26.35
Fish	34.26
Egg	27.30
Fats and oils	100.00
Nuts and oil seeds	75.00
Sugar and jaggery	100.00
Spices and condiments	100.00

Table 22. Classification of various food items on the basis of percentage frequency score

Sl. No	Frequency of use	Food items
1.	Most frequently used	Cereals, fats and oils, spices and condiments, sugar and jaggery
2.	Medium frequently used	Pulses, other vegetables, roots and tubers, nuts and oil seeds
3.	Less frequently used	Leafy vegetables, fruits, milk and milk products, meat, fish, egg

The frequency of use of different food items among the selected families was assessed by the formula suggested by

Reaburn *et al.* (1979) (Appendix V) and the percentage score is furnished in Table 21. The results indicated that the maximum score of 100 per cent was obtained for cereals, spices and condiments, fats and oils and sugar and jaggery. The food frequency score obtained for pulses, roots and tubers, other vegetables, milk and milk products and nuts and oils seeds varied from 48.33 to 75 per cent. In the case of green leafy vegetables, fruits, meat, fish and egg the frequency score obtained was found to be less than 35 per cent.

Based on the percentage frequency scores obtained for different food items the foods were classified into three groups viz., most frequently used (percentage score above 75%), medium frequently used (percentage score 50 to 75%) and less frequently used (percentage score below 50%) food stuffs.

The results (Table 22) indicated that cereals, fats and oils, spices and condiments, sugar and jaggery were the most frequently used food items by families while pulses, other vegetables, roots and tubers and nuts and oils seeds were the moderately used food items. Green leafy vegetables, fruits, milk and milk products, meat, fish and egg were used to a lesser extend by the families.

#### **4.2.4 Meal pattern of the family**

Table 23 furnishes the details on meal planning, basis for meal planning, number of meals per day, time schedule if followed and food distribution pattern.

Table 23. Details of meal pattern n=120

Details	f	%
1. Planned meals in advance	34	28.33
No meal planning	86	71.67
2. Basis for meal planning		
Food availability	34	28.33
3. Number of meals per day		
Three	120	100
4. Time schedule		
No time schedule	120	100
5. Food distribution		
Equality in food distribution	120	100

The analysis of the meal pattern of the families indicated that only 28.33 per cent of the families planned their meals in advance and they planned the meals on the basis of availability of foods. All the families had a three meal a day pattern. The families neither maintained any accounts for food expenditure nor followed specific time schedule for taking meals. It was also observed that none of the families gave preference to any of the family members for giving food.

From the study it could be seen that nobody had the habit of drinking boiled water and not included any raw foods except tomato and onion in their diet.

All the families used left over foods.

### 4.2.5 Cooking pattern

From Table 24 it was revealed that majority of the families (79.17%) cooked food twice a day where as the rest of the families (20.83%) cooked only once in a day. About 59.16 per cent of the families used aluminium utensils and earthen pots for cooking food stuffs where as 31.67per cent of the families used only aluminium vessels. Only a minority of 9.17 per cent of the families used steel vessels along with aluminium utensils and earthen pots. Majority of the families (89.17%) used ordinary hearth for cooking and only a minority of 10.83per cent used kerosene stove. None of the families used any labour saving devises in the kitchen.

Table 24. Cooking pattern adopted by the families n=120

Sl. No	Category	f	%
1	Time of cooking		
	Once	25	20.83
	Twice	95	79.17
2	Cooking vessels used		
	Steel, Aluminium, earthen pot	11	9.17
	Aluminium	38	31.67
	Aluminium and earthen pot	71	59.16
3	Cooking devices used		
	Ordinary hearth	107	89.17
	Kerosene stove	13	10.83

#### 4.2.6 Cooking methods followed for various foods

Among the various cooking methods (Table 25) adopted by the families boiling was found to be predominant. Boiling and straining the excess water was used for cooking cereals by all the families. Boiling or absorption method was used for cooking pulses, roots and tubers, other vegetables, leafy vegetables, meat etc., by all the families. Boiling or shallow fat frying were the methods adopted for cooking fish, meat and egg. Milk was boiled before using by all the families.

Table 25. Cooking methods adopted by the families n=120

Sl. No.	Category	Food stuffs	f	%
1	Boiling and straining	Cereals	120	100
2	Boiling or absorption	Pulses, roots and tubers, other vegetables, leafy vegetables and meat	120	100
3	Boiling or shallow fat frying	Fish, meat, egg	120	100
4	Boiling	Milk	120	100

#### 4.2.7 Preservation of foods

It was seen from Table 26 that only 43.33 per cent of the families preserved mango and lemon in the form of pickle while the rest bought pickles available in sachets from the market. Other than pickling other preservation methods were not adopted by the families.

Table 26. Details of food preservation n=120

Sl. No.	Category	f	%
1	Prepared pickles at home	52	43.33
2	Purchased from market	68	56.67

#### 4.2.8 Storage of foods

Most common storage methods adopted by the families were drying and storing in tight containers for cereals and pulses.

#### 4.2.9 Foods given during special conditions

It was seen from Table 27 that special foods like ragi, arrow root and banana powder other than breast milk were the supplementary foods given to infants by all the families. No special food was given to preschool children, adolescents, pregnant and lactating women and to the aged.

Table 27. Details of foods given during special conditions n=120

Sl. No	Category	Special food	f	%
1	Infancy	Special food (ragi, banana flour and arrow root powder)	120	100
2	Preschool children, adolescent, pregnancy and lactation, old age	No special food	120	100

#### **4.2.10 Foods prepared for special occasions**

Marriage, birthday and death ceremony were the occasions when special foods were prepared by the families. All the families except the Muslim family prepared vegetarian foods during marriage, birthday and other festive occasions whereas non vegetarian foods were preferred by Muslim family during these occasions. It could be observed that both Hindu and Muslim families prepared non vegetarian foods during death ceremony.

#### **4.2.11 Diet during diseases**

It was observed that all the families included semisolid foods like rice gruel during diseased conditions like fever, diarrhoea, chicken pox, measles and mumps. Non vegetarian foods and fried foods were avoided during diseased conditions.

#### **4.2.12 Food believes**

All the families surveyed had awareness about some of the food believes like pregnant women are not supposed to eat papaya fruit and pineapple, curd and banana are not supposed to be taken during fever, drumstick leaves should be avoided during Karkidaka month, during the period of Grahanam do not consume any food and rice should be avoided during fasting. However, it was observed that the families did not follow these believes. But they avoided rice during fasting days.

### **4.3 NUTRITIONAL STATUS OF THE RESPONDENTS**

Nutritional status of women labourers engaged in rice cultivation was ascertained through anthropometric methods,

actual food intake, clinical examination to identify the deficiency symptom and biochemical estimation of blood for haemoglobin.

#### **4.3.1 Anthropometric measurements**

Anthropometric measurements like weight and height of all the 120 respondents indicated that the weight varied from 30 kg to 65 kg with a mean weight of 43.1 kg and the height varied from 140 cm to 162 cm with an average height of 149 cm.

The weight of each respondent was compared with the reference body weight of 50 kg suggested by ICMR (1990) for adult women and the results (Table 28) indicated that the body weight of 86.67 per cent of the respondents was lower than the body weight of a reference woman. Out of this the body weight of 45 per cent of the respondents was found to be below 40 kg. The mean weight (43.1kg) of the respondents was found to be significantly lower than the body weight suggested for a Reference Indian Women (t value 5.66\*\*).

When the respondents were grouped based on their height it was found that the height of 67.5 per cent of the respondents varied from 140.1 cm to 150 cm.

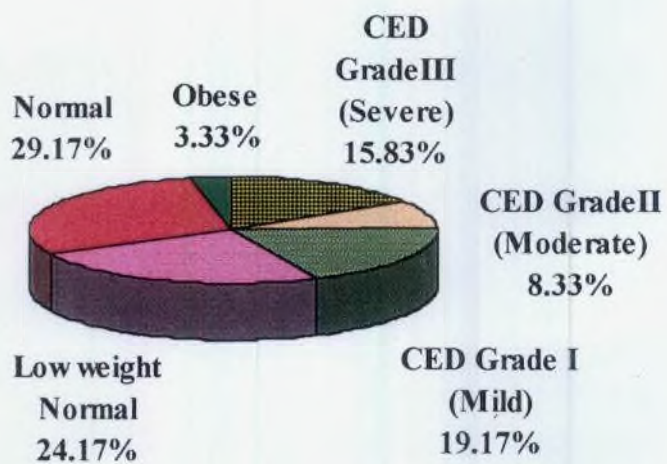


**Table 28. Distribution of respondents on the basis of weight and height n=120**

Weight (Kg)	n	%	Height (cm)	n	%
30-39	54	45.00	140.1-145	34	28.33
40-49	50	41.67	145.1-150	47	39.17
50-59	14	11.67	150.1-155	26	21.67
60-69	2	1.66	155.5-160	11	9.17
			160.1-165	2	1.66

#### **4.3.2 Body Mass Index of respondents**

The prevalence of chronic energy deficiency among the respondents on the basis of Body Mass Index (BMI) are presented in table 29. The results indicated that 43.33 per cent had various grades of CED. The extend of malnutrition as mild (CED Grade I), moderate (CED Grade II) and severe (CED Grade III) was found to be 19.17 per cent, 8.33 per cent and 15.83 per cent respectively. Women belonging to normal group with a BMI in between 20 to 25 was found to be 29.17 per cent while 24.17 per cent had normal nutritional status with low body weight. The rest of the respondents (3.33 %) were found to be obese. The prevalence of different grades of CED among women agricultural labourers are presented in Figure 1.



**Fig. 1. Percentage distribution of women labourers based on BMI**

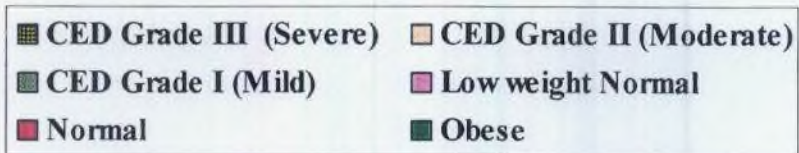


Table 29. Prevalence of CED among the respondents on the basis of Body Mass Index n=120

Chronic energy deficiency grade (BMI)	Grades of malnutrition	n
CED Grade III (<16)	Severe	19 (15.83)
CED Grade II (16-17)	Moderate	10 (8.33)
CED Grade I (17-18.5)	Mild	23 (19.17)
Low weight normal (18.5-20.0)	Normal with low weight	29 (24.17)
Normal (20.0-25.0)	Normal	35 (29.17)
Over weight (>25)	Obese	4 (3.33)

Number in parentheses are percentages

Table 30 depicts the mean values of weight and height by CED grades among the respondents. It can be seen that the mean values of weight and BMI decreased consistently with the severity of under nutrition from normals followed by CED I, CED II and CED III. However, Grade III women had taller stature than the normal and grade I and II CED women.

Table 30. Mean anthropometric measurements by CED grades among women agricultural labourers

CED Grade (Number of women)	Wt(kg) Mean $\pm$ S.Error	Ht(cm) Mean $\pm$ S.Error	BMI(kg/m <sup>2</sup> ) Mean $\pm$ S.Error
Grade I (23)	39.78 $\pm$ 0.426	149 $\pm$ 0.009	17.80 $\pm$ 0.062
Grade II (10)	37.10 $\pm$ 0.849	149 $\pm$ 0.020	16.54 $\pm$ 0.097
Grade III (19)	33.63 $\pm$ 0.593	150 $\pm$ 0.012	14.87 $\pm$ 0.191
Low weight normal (29)	43.41 $\pm$ 0.936	150 $\pm$ 0.009	19.29 $\pm$ 0.057
Normal (35)	47.02 $\pm$ 0.534	147 $\pm$ 1.44	21.83 $\pm$ 0.241

Table 31. Relationship between anthropometric measurements with BMI

Details	Correlation coefficient
Weight Vs BMI	0.765**
Height Vs BMI	-0.049 <sup>NS</sup>
Height Vs weight	0.108 <sup>NS</sup>

\*\* = Significant at 1 % level , \*\* = P < 0.01

NS = Non significant

Table 31 reveals that the correlation between weight and BMI is highly significant where as there is no significant relation between height and BMI and height and weight.

Table 32. Correlation coefficient of anthropometric measurements in different grades of CED

Variables	L.W. normal	Normal	Grade I	Grade II	Grade III
Weight & BMI	0.267 <sup>NS</sup>	0.743**	0.037 <sup>NS</sup>	-0.729**	0.510*
Height & BMI	0.140 <sup>NS</sup>	-0.172 <sup>N</sup>	-0.129 <sup>NS</sup>	-0.817**	-0.275 <sup>NS</sup>
Height & weight	0.579 <sup>NS</sup>	-0.055 <sup>NS</sup>	0.631 <sup>NS</sup>	0.990 <sup>NS</sup>	0.685 <sup>NS</sup>

\* Significant at 5 % level, \* = P < 0.05

\*\* Significant at 1 % level, \*\* = P < 0.01

The relationship between anthropometric measurements in different grades of CED among women agricultural labourers is shown in the form of correlation coefficients (Table 32)

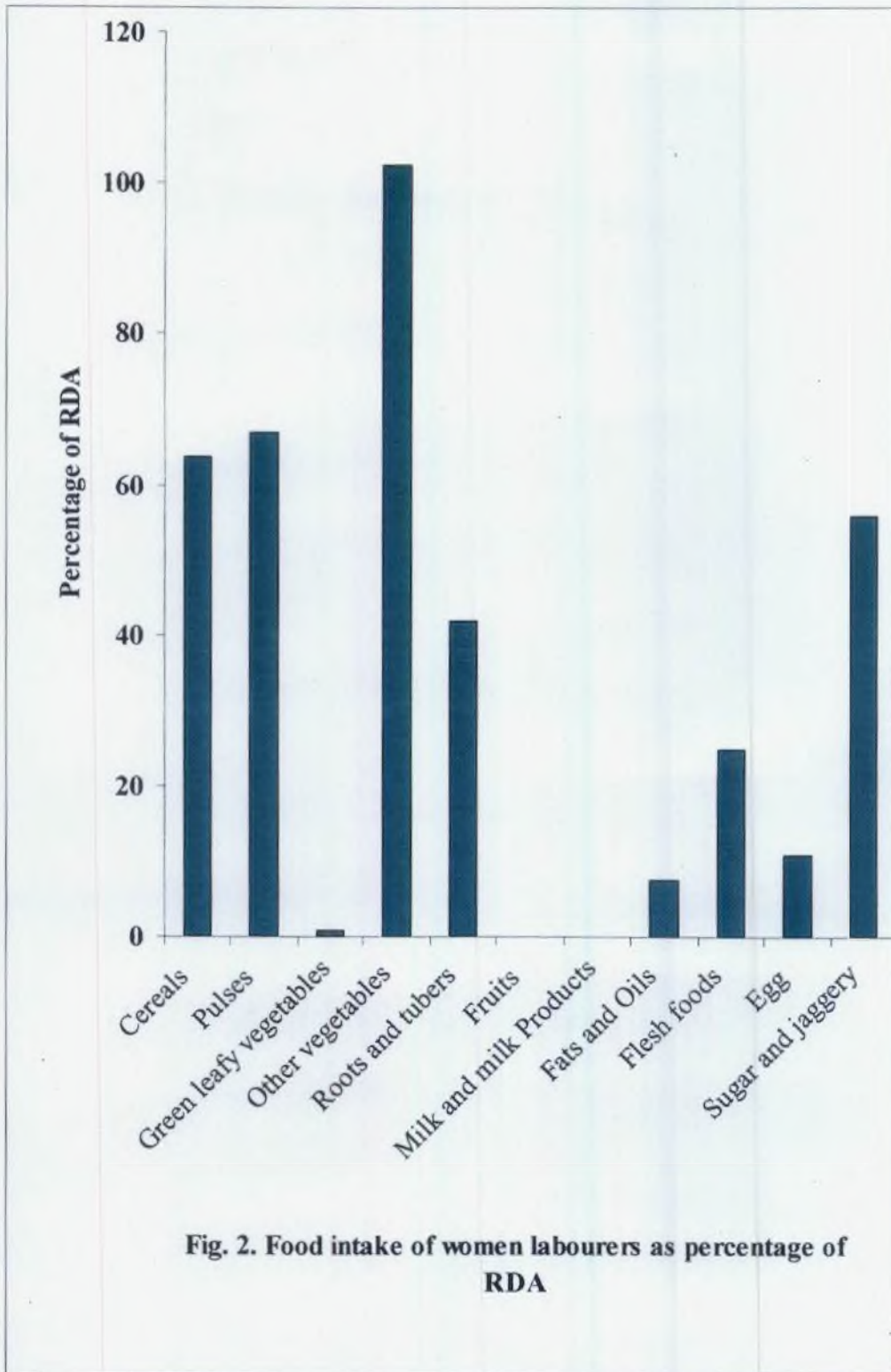
The results indicated that there is no significant relation between height and weight. The correlation between weight and BMI was significant only for normal and grade III CED.

#### **4.3.3 Actual food and nutrient intake**

An indepth study among the subsamples of 30 women labourers was conducted by one day food weightment method to determine their actual food intake. The quantity of each food groups item was compared with the quantity specified for a balanced diet as suggested by ICMR (1984). The nutrients present in the diet of women were calculated using the food composition tables (Gopalan *et al.* 1989) and were compared with the 1989 Recommended Dietary Allowances (RDA) of nutrients suggested by ICMR (1990). Both the food and nutrient intake of women were statistically analysed. The results are furnished in Tables 33 and 34 and Figures 2 and 3.

##### **4.3.3.1 Food intake**

The mean food intake of women (Table 33) indicated that intake of all foods except other vegetables was lower than the recommended levels. Milk and milk products and fruits were not at all included in the diet of women. The percentage intake of different food groups in comparison with the RDA is illustrated in Fig 2.



**Fig. 2. Food intake of women labourers as percentage of RDA**

Table 33. Mean food intake of the respondents in comparison with the RDA

Food group	Mean Food intake Mean $\pm$ SE	RDA (g)	% RDA	t value compared with RDA
Cereals (g)	280.17 $\pm$ 13.303	440	63.67	11.17**
Pulses (g)	16.76 $\pm$ 6.864	25	67.04	1.20 <sup>NS</sup>
Green leafy vegetables (g)	.7 $\pm$ 0.501	100	0.7	198.20**
Other vegetables (g)	40.97 $\pm$ 8.521	40	102.43	0.11 <sup>NS</sup>
Roots and tubers (g)	20.9 $\pm$ 6.672	50	41.8	4.36**
Fruits(g)	Nil	30	-	-
Milk and milk product(g)	Nil	150	-	-
Fats and oils(g)	2.23 $\pm$ 0.164	30	7.43	169.32**
Flesh food(g)	7.5 $\pm$ 5.523	30	25	4.07**
Egg(g)	3.23 $\pm$ 2.313	30	10.77	11.57**
Sugar and jaggery(g)	11.16 $\pm$ 0.969	20	55.8	9.12**

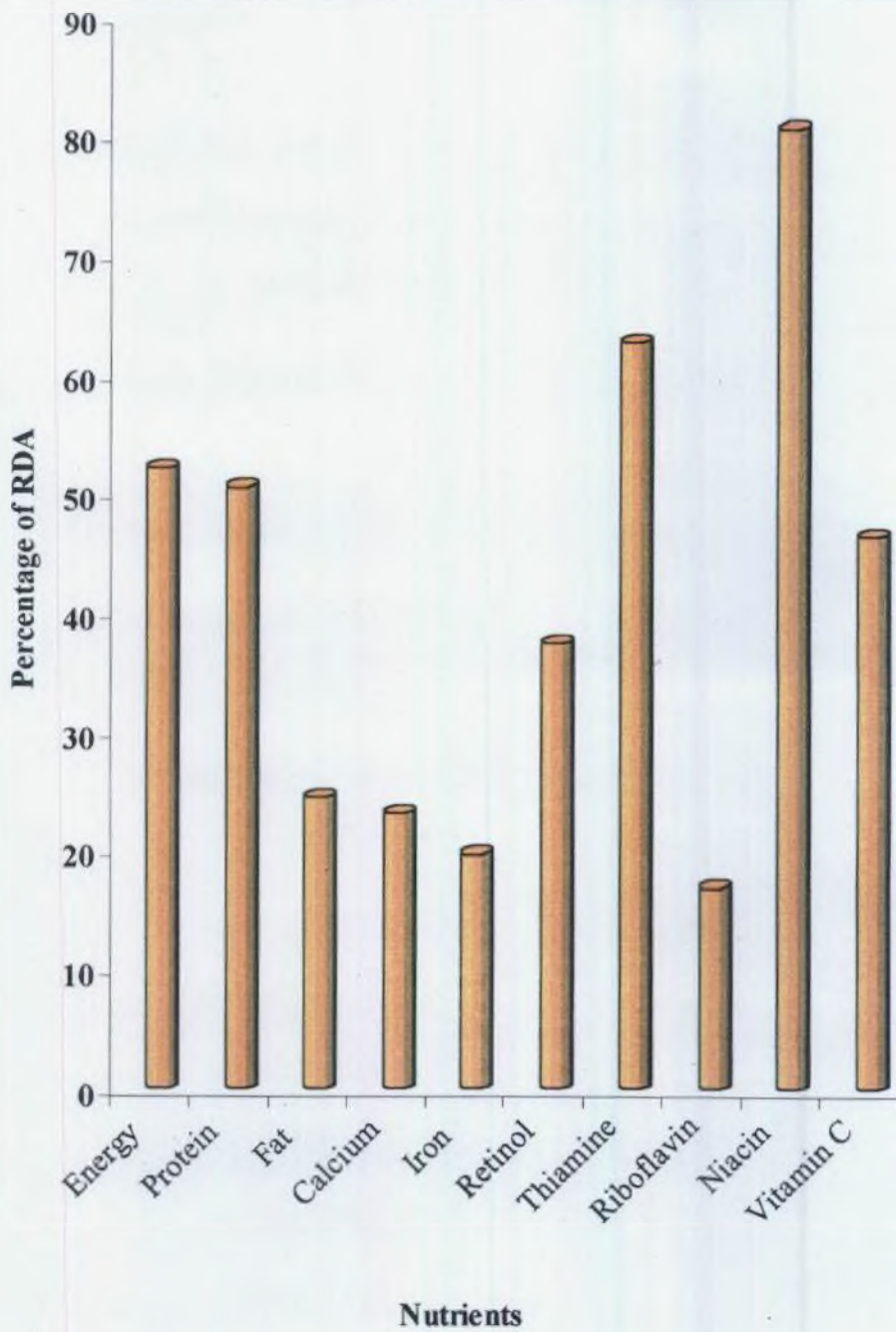
RDA Recommended Dietary Allowance

\*\* Significant at 1 per cent level

NS Non significant

#### 4.3.3.2 Nutrient Intake

The mean nutrient intake of women was compared with the RDA and the results are presented in Table 34 & Figure 3.



**Fig. 3. Nutrient intake of women labourers as percentage of RDA**



The results revealed that the percentage intake of all nutrients among women labourers were significantly lower than the RDA. The percentage intake of calcium, iron, retinol, riboflavin and vitamin C was found to be below 50 per cent of RDA suggested for women engaged in moderate activity. About 52 per cent and 50 per cent of energy and protein intake respectively were met by the respondents while thiamine and niacin intake were found to be above 63 per cent and 81 per cent of RDA.

Table 34. Mean nutrient intake of the respondents in comparison with RDA

Nutrients	Mean $\pm$ SE	RDA	% RDA	t value compared with RDA
Energy (k cal)	1162.00 $\pm$ 60.106	2225	52.20	17.69**
Protein (g)	25.00 $\pm$ 2.195	50	50.62	11.25**
Fat (g)	4.917 $\pm$ 0.587	20	24.59	10.63**
Calcium (mg)	93.00 $\pm$ 13.636	400	23.21	22.53**
Iron (mg)	5.93 $\pm$ 1.038	30	19.77	23.19**
Retinol ( $\mu$ g)	224.00 $\pm$ 102.706	600	37.39	3.66**
Thiamine (mg)	0.69 $\pm$ 0.045	1.1	62.72	9.11**
Riboflavin (mg)	0.22 $\pm$ 0.026	1.3	16.92	41.54**
Niacin (mg)	11.31 $\pm$ 0.626	14	80.79	4.29**
Vitamin C (mg)	19.00 $\pm$ 5.059	40	46.45	4.23**

\*\* Significant at 1 per cent level

#### 4.4 COEFFICIENT OF VARIATION OF DIFFERENT CHARACTERS

Table 35. Coefficient of variation of different characters

Characters	Coefficient variation
Family size	32.35
Education	148.17
Income	59.63
Percapita income	43.80
<u>Food intake</u>	
Cereal	27.96
Pulses	224.17
Green leafy vegetables	392.00
Other vegetables	113.92
Roots and tubers	174.86
Fruits	547.44
Fats and oils	40.35
Meat and fish	403.30
Egg	392.26
Sugar and jaggery	47.49
<u>Nutrient intake</u>	
Energy	28.71
Protein	47.50
Fat	65.36
Calcium	80.45
Iron	95.88
Carotene	51.00
Thiamine	250.69
Riboflavin	35.49
Niacin	64.28
Vitamin C	30.32

The average family size ranged from four to six and had coefficient variation of 32.35 per cent (Table 35). The education level of the women labourers showed drastic variation with the minimum qualification of lower primary and maximum level of college education. The coefficient of variation was 148.17.

Compared to the education not much variation was observed in income, as the CV was only 59.63 per cent. The average income ranged from Rs. 500 to Rs. 2500 per month. In close resonance with average income the percapita income also varied from Rs. 150 to Rs. 850 with a coefficient variation of 43.8 per cent.

The lowest coefficient of variation was with regard to intake of cereals (CV - 27.96%). The consumption of pulses showed a CV of 224.17 per cent. It could be observed that the average consumption of pulses varied from 0 g to 150 g. Green leafy vegetables showed a CV of 392 per cent and the intake ranged from 0 g to 13 g per day. The maximum consumption of other vegetables was 150 g. As regards roots and tubers the maximum consumption was found to be 130 g with a CV of 174.86 per cent. Fruits seem to be the most highly variant food item with a CV of 547.44 per cent. Maximum consumption of fruits was 200 g whereas the fruits seemed to be a scarce food item for most of the respondents. Fats and oils showed a low CV of 40.35 per cent. Minimum consumption of fats and oils was 2g where as maximum consumption was 6 g. In close variant with green leafy vegetables, meat and fish showed a CV of 403.30 per cent. The CV for egg was found to be 392 per cent. The consumption of meat and fish varied from 0g to 162 g where as that of egg varied from 0g to 60 g. Sugar and jaggery had a CV of 47.49 per cent, the maximum consumption being 34 g and minimum 10g.

Energy available from the various food items recorded a minimum of 755.8 kilocalories and a maximum of 1472.6 kilocalories, the coefficient of variation being 28.71 per cent. Protein and fat showed a CV of 47.5 per cent and 65.36 per cent respectively. The maximum intake of protein and fat was found to

be 58.8 g and 17.7 g respectively. Calcium and iron had more or less the same CV of 80.45 per cent and 95.88 per cent respectively. The minimum and maximum intake of calcium were 23.1 mg and 362mg and that of iron 1.31 mg and 14 mg respectively. The coefficient of variation for carotene was found to be 51 per cent with a minimum of 15 $\mu$ g and a maximum of 2660  $\mu$ g.

Coefficient variation was very high as regards thiamine (250.69 %). The minimum thiamine consumption was 0.15mg and maximum was 1.42mg. Riboflavin content had a CV of 35.49 per cent with a minimum and maximum of 0.06 mg and 0.59mg respectively. Niacin showed a CV of 64.28 per cent, the minimum intake being 2.65 mg and maximum 19.96 mg. The intake of Vitamin C varied from 0mg to 88.9 mg.

Table 36 Correlation Between Body Mass Index and Independent Variables

Variable No.	Independent Variables	Correlation coefficient
1.	Family size	-0.008
2.	Income	0.243
3.	Per capita income	0.324
4.	Food intake	
	a) Cereals	0.075
	b) Pulses	-0.433*
	c) Green leafy vegetables	-0.137
	d) Other vegetables	0.350
	e) Roots and tubers	0.013
	f) Fruits	-0.226
	g) Fats and oils	0.068
	h) Meat and fish	0.214

Variable No.	Independent Variables	Correlation coefficient
5.	i) Egg	-0.111
	j) Sugar and Jaggery	0.234
	Nutrient intake	
	a) Energy	-0.044
	b) Protein	-0.229
	c) Fat	0.087
	d) Calcium	-0.406
	e) Iron	-0.204
	f) Carotene	-0.186
	g) Thiamine	-0.221
	h) Riboflavin	-0.357
	i) Niacin	0.082
j) Vitamin C	-0.010	

There was no significant relationship between BMI and the various parameters under observation like family size, income and percapita income .When the relationship of the BMI and food intake was worked out separately with regard to cereals, pulses, greenleafy vegetables, other vegetables, roots and tubers, fruits, fats and oils, meat and fish, egg and also sugar and jaggery, only the pulse intake showed negative correlation. The correlation between BMI and various nutrient parameters like energy , protein, fat , calcium, iron , carotene, thiamine, riboflavin, niacin and vitamin C also showed no significant relationship.

Relationship between family size and food intake was analysed. No significant relation was noted between family size and intake of cereals, pulses, green leafy vegetables, other vegetables , fruits, milk and milk products, meat and fish, egg , fats and oils and sugar and jaggery except roots and tubers.

Highly significant relation was observed between family size and intake of roots and tubers. The relation between family size and intake of roots and tubers is shown in a two way table. (Table 37).

Table. 37 Relation between family size and intake of roots and tubers

Family size	Roots and tubers			Total	$\Psi^2$ value
	0(g)	1-49 (g)	50-99 (g)		
2	1	0	1	2	21.71**
3	4	1	1	6	
4	4	2	0	6	
5	5	4	1	10	
6	1	1	2	4	
7	1	1	0	2	
	16	9	5		

From the table it is evident that the distribution of the intake of root and tubers varied drastically over the family size. The maximum number of families belonged to the category of not consuming roots and tubers. Only five families consumed at the rate of 50g per person per day. Maximum consumption of tubers could be noticed with a family size of five.

#### 4.5 CLINICAL ASSESSMENT

Incidence of clinical signs and symptoms observed among the respondents are presented in Table 38. It was found that about 33.33 per cent of the respondents were good in appearance while 16.67 per cent of the respondents were poor in appearance. Different clinical symptoms related to nutritional deficiencies like diffuse depigmentation in face (57%), angular

stomatitis (26.67 %), oedema in tongue (3.33%), diffuse or local skeletal deformities (60 %), goitre (10 %), Xerosis in skin (20 %), Pale conjunctiva, (66.67%), Koilonychia (16.67%), dental carries (43.33 %) were observed among women agricultural labourers.

Table 38. Clinical manifestations observed among the respondents

	Clinical details	Present
i)	<b>General appearance</b>	
	Good	10 (33.33)
	Fair	15 (50)
	Poor	5 (16.67)
ii)	<b>Face</b>	
	Diffuse depigmentation	17 (56.67)
	Nasolabial dyssebacea	1 (3.33)
	Moon face	1 (3.33)
	No symptoms	11 (36.67)
iii)	<b>Eyes</b>	
	Pale conjunctiva	20 (66.67)
	No symptoms	10 (33.33)
iv)	<b>Lips</b>	
	Angular stomatitis	8 (26.67)
	Angular scars	5 (16.67)
	Chelosis	2 (6.66)
	No symptoms	15 (50)
v)	<b>Tongue</b>	
	Odema	1 (3.33)
	Scarlet and raw tongue	1 (3.33)
	No symptoms	28 (93.3)
vi)	<b>Muscular and motor systems</b>	
	Muscular wasting	1 (3.33)
	Diffuse or local skeletal deformities	18 (60)

	Clinical details	Present
	Motor weakness	1 (3.33)
	Calf tenderness	2 (6.67)
	No symptoms	8 (26.67)
vii)	Glands	
	Thyroid	3 (10)
	No symptoms	27 (90)
viii)	Skin	
	Xerosis	6 (20)
	Follicular hyperkeratosis	2 (6.67)
	Scrotal and vulval dermatosis	2 (6.67)
	No symptoms	20 (66.66)
ix)	Nails	
	Koilonychia	5 (16.67)
	No symptom	25 (83.33)
x)	Teeth	
	Carries	13 (43.33)
	Mottled enamel	6 (20)
	No symptoms	11 (36.67)

Number in parentheses are percentages

#### 4.6 BIOCHEMICAL ESTIMATION OF BLOOD

The blood haemoglobin was estimated among 30 women labourers and the haemoglobin values were compared with the standard values for adult non pregnant women suggested by WHO as given in Gopaldas and Seshadri (1987) (Table 39).



Table 39. Distribution of respondents on the basis of haemoglobin level n=30

Hb level (g/dl)	n	%
6-8	2	6.67
8-10	17	56.67
10-10.8	11	36.66
Normal 12 g100ml <sup>-1</sup>	0	0

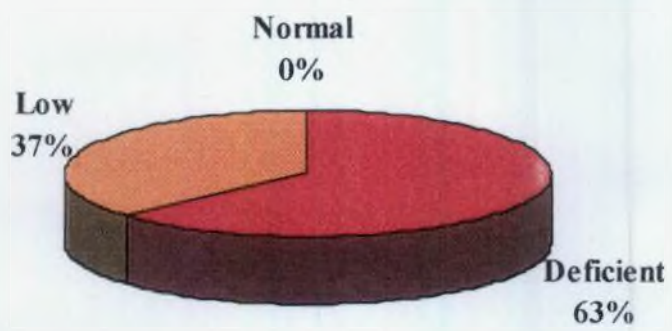
It was revealed that the haemoglobin values of all the respondents were lower than the normal haemoglobin level of 12g 100ml<sup>-1</sup>. Among 6.67 per cent of the respondents the haemoglobin values varied between 6-8 g100ml<sup>-1</sup> while in 56.67 per cent the level was found to be in between 8-10 g100ml<sup>-1</sup>. The haemoglobin values of 36.66 per cent of women was found to be above 10 g100ml<sup>-1</sup>.

To interpret the iron status of women labourers, they were grouped according to the criteria suggested by Gopaldas and Seshadri (1987) with reference to haemoglobin level and the details are given in Table 40.

Table 40. Distribution of respondents based on iron status n=30

Sl. No.	Category	n	%
1	Deficient (10 g100ml <sup>-1</sup> )	19	63.33
2	Low (10-11.9g100ml <sup>-1</sup> )	11	36.67
3	Acceptable (>12g100ml <sup>-1</sup> )	Nil	-

The results indicated that 63.33 per cent of the respondents had deficient iron status while the rest 36.67 per cent had low iron status on the basis of haemoglobin values (Figure 4).



**Fig. 4. Iron status of women labourers on the basis of haemoglobin level**

■ Deficient ■ Low □ Normal

#### 4.7 WORKING PATTERN OF THE RESPONDENTS

Table 41 gives the details regarding the working pattern of the respondents. It was found that about 81.67 per cent of the respondents get work for three days in a week while about 18.33 per cent get work for four days per week. Lack of work in the field is the main reason for not going for work. Table 41 indicated that all the respondents spent about 7 ½ hours for agricultural operations in a day. Sixty five per cent of them start to work at 7 a.m. and stop at 4 p.m. and the rest (35 %) start at 8 a.m. and stop at 5 p.m. All the respondents had half an hour interval in the morning from 10 to 10.30 am and one hour interval in the after noon from 1 to 2 pm. It was found that majority (81.67 %) of the women labourers were not going for any other work during off season and worked only for one farmer.

Some tasks are exclusively performed by men and some by women. The tasks assigned to men were found to be ploughing, levelling, irrigation, fertilizer application, storing of grains and straw and pesticide application where as the tasks assigned to women were transplanting and weeding. Tasks like harvesting, threshing and winnowing were performed by both men and women (Table 41).

Considering the details regarding the work during different seasons it was found that majority (68.33%) of the respondents used to get about 20-25 days work in summer. Only 9.17 per cent used to get 25-30 days of work. During rainy season it was found that 69.17 per cent used to get work only upto 10 days per month while 12.5 per cent used to get 15-25 days of work.

Table 41 revealed that most (93.33 %) of the respondents owned a sickle as an agricultural implement. It was also found that 57.5 per cent of the respondents used to get Rs. 40 as their daily wage while for 35.83 per cent the wage was found to be Rs. 50/day and the rest (6.67%) used to get Rs. 60 daily. Compared to women, men used to get Rs. 80to Rs. 110 while the wage of women varied from Rs. 40 to Rs. 60 depending upon the work load.

It was also observed that all the respondents liked their working environment.

Table 41. Details regarding the working pattern n=120

i) Details of frequency of work in a week		
Frequency work	n	%
3 days	98	81.57
4 days	22	18.33
ii) Details of working time		
Working time	n	%
7 am to 4 pm (7 ½ hours)	78	65
8 am to 5 pm (7 ½ hours)	42	35
iii) Details of working condition		
Details	n	%
Work under one farmer	98	81.67
Different farmers	22	18.33

iv) Details of work performed by men and women		
Performance	Details of work	
Only men	Ploughing, levelling, irrigation, fertilizer application, storing of grains and straw and pesticide application	
Only women	Transplanting, weeding	
Both men and women	Harvesting, threshing, winnowing	
v) Details of work during different seasons		
Details	Number of days	Number of respondents
Summer season	Upto 20	27 (22.5)
	20-25	82 (68.33)
	25-30	11 (9.17)
Rainy season	Upto 10	83 (69.17)
	10-15	22 (18.33)
	15-25	15 (12.5)
vi) Details regarding the agricultural implement		
Details	Number of respondents	%
Own sickle	112	93.33
From landlord	8	6.67
vii) Details regarding the wage of respondents per day		
Wage (Rs.)	n	%
40	69	57.5
50	43	35.83
60	8	6.67

#### 4.8 ENERGY EXPENDITURE PATTERN

Details about the daily energy intake and expenditure pattern are presented in Table 42a. The women labourers had deficient energy intake when compared with the total energy expenditure for different activities. The mean energy expenditure (2154.9 kcal) were found to be higher than the mean energy intake (1161.5 kcal). The difference between energy intake and energy expenditure indicated that the mean difference (-993.4 kcal) was very low.

The women labourers were classified based upon the difference between energy intake and energy expenditure. The maximum difference of 1200-1500 was observed among 23.33 per cent of the respondents.

Table 42a. Comparison of the energy intake and expenditure pattern of women agricultural labourers n=30

Sl. No.	Age (year)	Weight (Kg.)	Energy intake (kilo calorie)	Energy expenditure (kilo calorie)	Difference
1	39	40	767.6	2128	-1360.45
2	40	45	755.8	2206.9	-1451.1
3	40	39	1018.7	2112.2	-1093.5
4	33	45	1019.5	2206.9	-1187.4
5	40	30	663.3	1970.3	-1307
6	40	50	858.2	2285.7	-1427.5
7	32	45	982.7	2206.9	-1224.2
8	40	45	1041.3	2206.9	-735

Sl. No.	Age (year)	Weight (Kg.)	Energy intake (kilo calorie)	Energy expenditure (kilo calorie)	Difference
9	30	42	1424.5	2159.5	-735
10	30	53	1218.3	2333	-1114.7
11	20	50	1107.5	2224.9	-1117.4
12	38	47	1104.42	2238.4	-1134
13	38	40	1215.31	2128	-912.7
14	40	45	1348.22	2206.9	-858.9
15	39	50	1304	2285.7	-981.7
16	38	48	1345.3	2254.2	-908.9
17	40	44	1484.3	2191.1	-706.8
18	37	33	1146.8	2017.6	-870.8
19	38	47	1257	2238.4	-981.4
20	29	42	1472.8	2012.1	-539
21	32	37	916.8	2080.7	-1163.9
22	40	42	1384.8	2159.5	-774.7
23	40	36	956.6	2064.9	-1108.3
24	27	39	1227.3	1932.3	-705
25	30	43	949.1	2175.3	-1226.2
26	40	46	1089.8	2222.6	-1132.8
27	40	41	812.7	2143.8	-1331.1
28	40	34	1353.4	2033.4	-680
29	32	40	1942.6	2128	-185.4
30	29	45	1676.8	2091.9	-415.1

Difference of 900-1200 was observed among 43.33 per cent and difference of 600-900 was observed among 23.34 per cent. Only a minority of 3.33 per cent showed the difference less than 300 (Table 42b).

Table 42b. Classification according to difference of daily energy intake from daily energy expenditure n=30

Difference of energy intake from energy expenditure	Number of respondents	%
1200-1500	7	23.33
900-1200	13	43.33
600-900	7	23.34
300-600	2	6.67
0-300	1	3.33



# **Discussion**

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## **DISCUSSION**

A critical and brief discussion of the major findings of the study are presented in this chapter. The discussion is categorised into the following broad sections.

- 5.1 Socio economic profile of the agricultural labour households
- 5.2 Food consumption pattern of the agricultural labour households
- 5.3 Nutritional status of women agricultural labourers
- 5.4 Working pattern and energy expenditure pattern of the women agricultural labourers

### **5.1 SOCIO ECONOMIC PROFILE OF THE AGRICULTURAL LABOUR HOUSEHOLDS**

In the present study all the households were Hindus except one which was a Muslim household. Among Hindus also it was found that the households either belonged to other backward communities (65.83%) or scheduled caste (34.17%). Due to urbanisation and changes in social values joint family system is disintegrating in different communities of Kerala. According to Saxena (1986) nuclear type families are better than joint families in health and development. In the present study it was seen that majority (80%) of the households followed nuclear type family system. Similar findings were observed among the different labour groups of Kerala by Thomas (1989), Nagammal (1989), Seshadrinath (1993), Karuna (1993) Ranganathan (1996), Shyna (1996), Jose (1998), Smitha (1999) Anil *et al.* (2001) and Ukkru

(2001). Nuclear type family system was also reported by NIN (1995) in the households of Kerala, Gujarat and Andrapradesh. Similar findings were reported by Swamy *et al.* (2000) in the household of Karnataka.

In Kerala, unlike other states, small family norm has become very popular even among the low income groups probably due to the availability of medical and educational facilities as well as the constant exposure of the public to small family norm through different media.

Family size is a major factor influencing the nutritional status of family members. Majority of the families (64.17%) in the study were found to be medium sized with 4-6 members. Similar findings of a small family norm was observed among the households of labourers of different categories in Kerala by Jayanthakumari (1993), Jose (1998), Smitha (1999) and Anil *et al.*(2001). Contrary to this finding Usha *et al.* (1990) reported that most of the labour families in Thiruvananthapuram district of Kerala had a large family size consisting of five to nine members. Shatrugna *et al.* (1993) and Swamy *et al.* (2000) also reported larger families in the households of Hyderabad and Karnataka respectively.

Kerala is a state which represent a different spectrum as far as sex ratio is concerned. Among the different states, Kerala has the highest sex ratio with 1058 females for 1000males (Farm guide, 2002) and is a solitary exception, while in all other states and Union Territories the sex ratio is adverse to women. The sex ratio of India according to the 2001 census was 933. In the present study also the sex ratio of agricultural labour households was

found to be 933 which was in favour of male members and is in marked contrast to the general trend of sex ratio in the state. Indira (1993) also reported a sex ratio of 967 among the scheduled tribes of Palakkad district. In this study it was observed that all the families of agricultural labours belonged either to schedule caste or other backward caste.

Literacy is an important demographic characteristic which is an indicator of the level of advancement of the people. Education is considered to be a catalyst of change and its role in the process of national development cannot be over emphasized (Manorama Year Book, 1996). The present study revealed that majority of the male (60.25%) and female (78.09%) members were literate. Smitha (1999) observed a higher percentage of literacy among men(91.07%) and women(86.51%) among the agricultural labourers. This supports the reports of census of India (2001) which ranked Kerala as the most literate state with a higher literacy rate of 90.02 percent (Manorama Year Book, 2001). In contrast to this Shyna (1996)and Jose (1998) observed higher percentage of illiteracy among the labourers of different sectors of Kerala.

In India, even though literacy level is very high, men have better education than women probably because of social discrimination against women (Ingle and Khai, 1987 and Joseph, 1991). Contrary to this observation the present study revealed that female members were more educated than their male counterparts. Similar findings were reported by Anil *et al.* (2001) among the dairy farmers of Kerala. In contrast, studies conducted by Sujatha (1990), NIN (1996) and Mathan (1998) in the states of Kerala, Haryana, Andrapradesh, Karnataka and Gujarat reported a

higher percentage of literacy among the male members than females. Lower percentage of literacy among females was also observed in rural areas of Hyderabad (Choudhary, 1990) and among the agricultural labour families of Trichur district (Smitha, 1999).

Occupational status of the family members indicated that majority of the male (77.64%) and female members (80.90%) were working in unorganised sector as agricultural labourers. Similar result was reported by Sujatha (1990) and Jose (1998) among the families of casual labourers and Smitha (1999) among the agricultural labourer families.

Land is one of the chief determinants of resource position. The present study indicated that all the families owned less than 20 cents of land. Cherian, (1992), Seshadrinath (1993) and Smitha (1999) also observed similar findings. Contradictory to this result Saikia (1982) pointed out that small farmers who owned landholdings upto five acres constituted nearly 70 per cent of the total number of farmers in India.

Though, all the households had few cents of land as their own, only 1.67 per cent cultivated paddy. Smitha (1999) also observed that only 7.68 per cent of the families of agricultural labourers in Thrissur district cultivated paddy in their land.

Majority of families in the present study did not have kitchen garden. Similar findings were reported by Udaya (1996) and Smitha (1999) in their studies among the farm families and agricultural labour families of Thrissur district. Contradictory to

this Jose (1998) observed kitchen garden among majority of the households of casual labourers in Thrissur district.

From the study it was observed that only 35 per cent of the families possessed domestic animals like goat, hen and cow. Similar reports were given by Jose (1998) and Smitha (1999) among the casual labourers and agricultural labourers of Thrissur district of Kerala.

With respect to the domestication of animals it was observed that only 35 per cent of the families had domestic animals in their house and out of this only 14.29 per cent received income from domestic animals. Udaya (1996) in her study among farm families observed that about 78.33 per cent possessed domestic animals and a majority (62.50 %) received income from domestic animals.

The economic status of a family is reflected by landholdings, family income, number of earning members in the family and monthly expenditure pattern (Wood and Baylock, 1982). The major source of income in all the surveyed families was found to be the wage they received as agricultural labourers. Majority (93.33%) of families had monthly income from Rs. 500 to Rs. 2500. Similar findings were reported by Shyna (1996) and Smitha (1999) among the agricultural labour families of Thrissur district. However Ranganathan (1996), Varma (1996) and Jose (1998) observed a monthly income of above Rs. 3000 among majority of the labourer households of different sectors of Kerala. Karuna (1993), Varma (1996) and Udaya (1996) reported a mean monthly income of below Rs. 3000 among the fish vending families of

Trivandrum district and casual labourer and farm families of Thrissur district.

Results highlighted that 25 per cent of the families took loan either from co-operative society or bank mainly for the marriage of their children. This finding is in line with the findings of Udaya (1996) and Smitha (1999) among the families of farm women and women agricultural labourers respectively. In contrast to this, Jose (1998) observed that casual labourers of Thrissur district took loan mostly from government agencies for the purchase of household articles and construction of houses. Ranganathan (1996) observed that women labourers working in coir industry borrowed money from private agencies to meet their immediate needs.

Monthly expenditure pattern of the families indicated that about 54.17 per cent of the families spent 50-70 per cent of their monthly income for food. Usha *et al.* (1990) also observed a similar finding among the farm families of Trivandrum district where majority spent 51-70 per cent of their income on food. Mathan (1998), Jose (1998) and Smitha (1999) also reported similar results in their studies among the labourer households in different segments of Kerala. In contrast, studies by Moorthy *et al.* (1983) and Devadas and Easwaran (1986) indicated that the rural households in Hyderabad and Tamil Nadu spent nearly 84 per cent and 90 per cent of the monthly income respectively on food. Studies conducted by Augustine (1993), Karuna (1993) and Ranganathan (1996) on labourers in various unorganised sectors of Trivandrum district also indicated that a monthly expenditure of about 65 to 75 per cent of the income on food.

Majority of the families spent less than 20 per cent of their monthly income for clothing, shelter and transportation, recreation, health, fuel and personal needs. Various studies conducted in different parts of Kerala have also found similar trends in monthly expenditure pattern (Usha *et al.* 1990, Augustine, 1993, Indira, 1993, Karuna, 1993, Devi, 2000. Contrary to this Jose (1998) observed that majority of the families of casual labourers spent less than 10 per cent of their income on clothing, education, transport, health, fuel, electricity, shelter, recreation and personal expenses.

None of the families saved money for future use. But studies conducted by Cherian (1992), Shyna (1996) and Smitha (1999) among the farm families and agricultural labourer households of Kerala reported that majority of the families saved money to meet their future necessities.

The result of the housing conditions revealed that majority of the families surveyed had their own house which are single storied with brick walls, tiled roof and with two to three rooms. Similar type of housing conditions were observed by Sujatha (1990) and Ranganathan (1996) among the households of unorganised sector in Kerala. Udaya (1996), Jose (1998) and Smitha (1999) also reported similar housing conditions among the households of farm women, casual labourers and agricultural labourers. Contrary to these observations Karuna (1993) revealed that fish vending women of Kerala stayed in one room apartments.

The main source of drinking water for the surveyed households was found to be public tap and well. Sujatha (1990), Usha *et al.* (1990) and Ranganathan (1996) observed that the



households of unorganised sectors of Kerala depended on public wells and taps as source of drinking water. In contrast to this, Udaya (1996) and Smitha (1999) reported that drinking water facilities for majority of the farm families and agricultural labourer families in Thrissur district was from their own well.

The lavatory and drainage facilities of the houses were found to be unsatisfactory. This result was in accordance with the results of Sujatha (1990), Karuna (1993) and Ranganathan (1996) among majority of families in different sectors of Kerala. Contrary to this finding better drainage and lavatory facilities were reported among agricultural labourer households of Trichur district by Shyna (1996) and Smitha (1999).

In Kerala, electrification has occurred even in remote villages. In the present study also it was found that 55.83 per cent of the families had electricity facilities. This finding is in concurrence with the observations of Shyna (1996), Mathan (1998), Jose (1998) and Smitha (1999) among the labour families of different categories.

Recreation facilities were present in 61.67 per cent of the households. Udaya (1996), Shyna (1996) and Smitha (1999) also observed recreational facilities among the farm families and agricultural labour families of Trichur district. However, the findings of Jose (1998) was found to be contradictory to the present finding in which the author observed fewer recreational facilities among the casual labourer households.

The transport facilities for majority of the families were the public conveyance. Similar observations were reported by

Udaya (1996), Jose (1998) and Smitha (1999) in their studies among the households of farm women, casual labourers and agricultural labourers.

Regarding the healthcare services it was observed that majority of the (77.5 %) families depended mainly on the primary health centre, private hospital and government hospital in their locality. Similar results were reported by Shyna (1996) and Smitha (1999) in their studies among the women agricultural labourers of Thrissur district.

Studies on social participation revealed that about 59 per cent were not members of any of the social organisations. In concordance to this, Varma (1996) and Jose (1998) revealed that majority of women casual labourers were not members of any social organisations. In contrast Udaya (1996) observed that majority of farm women of Thrissur district took membership in social organisations like Mahila Samajam and co-operative society and attended the meetings regularly.

Various contagious diseases like measles, chickenpox and mumps were observed among the families during the past one year. Jose (1998) among the casual labourers of Thrissur district also observed such type of contagious diseases. However, Smitha (1999) observed no epidemics among the agricultural labourers of Thrissur district.

## 5.2 FOOD CONSUMPTION PATTERN OF THE AGRICULTURAL LABOUR HOUSEHOLDS

Precise information on the food consumption pattern of people is essential not only for assessing the nutritional status of the community but also for elucidating the food needs of population groups at national or regional levels (Thimmayamma and Rau, 1996).

Though, all the families were found to be non vegetarians, the intake of non-vegetarian food items was limited due to their high cost. Sujatha (1990), Augustine (1993), Karuna (1993), Ranganathan (1996), Shyna (1996), Udaya (1996), Jose (1998), Mathan (1998), Smitha (1999) and Singh and Kumari (2001) in their studies also observed similar type of food habit among the families in different sectors of Kerala.

Like all Keralties, rice was found to be the staple food of the agricultural labour families.

Food expenditure is an important factor influencing the food consumption pattern. In this study the major expenditure incurred by the families was mainly for cereals. This is in line with the findings of Panicker (1979), Sujatha (1990) Jayanthakumari (1993), Ranganathan (1996), Jose (1998) and Smitha (1999) among the different labour categories of Kerala. Udaya (1996) reported that the farm families did not spend any money for the purchase of cereals. In this study, all the labourers were daily wage earners in the farms of a land owner and did not cultivate paddy. This may be the reason for spending more money for the purchase of cereals when compared to other food items.

None of the families spent any money for the purchase of protective food items like fruits and green leafy vegetables. It was interesting to note that majority of the families spent less than five per cent of their monthly income for the purchase of pulses, other vegetables, roots and tubers, milk and milk products, flesh foods, fats and oils, nuts and oilseeds, sugar and jaggary and spices and condiments. Though, all the families were non vegetarians the money spent for the purchase of meat, fish and egg was found to be very meagre. This may be due to the low income of the family to purchase various food items which are essential to maintain their health. Most of these observation were found to be in line with the findings of the dietary pattern of the families of fish vending women (Karuna, 1993), agricultural labourers (Shyna, 1996 and Smitha, 1999) and women engaged in stone breaking (Augustine, 1993). Shyna (2001) also reported decreased consumption of green leafy vegetables among the families of different communities in Thrissur district.

The economic status of the families and the local availability of food items are the two important factors which influences the frequency of various foods in their diet. The frequency score with respect to the use of foods revealed that the most frequently used food items are cereals, fats and oils, spices and condiments and sugar and jaggary. Similar dietary pattern was observed among the families of unorganised group (Augustine, 1993) and among agricultural labourers (Seshadrinath, 1993, and Smitha, 1999).

Medium frequently used foods included pulses, other vegetables, roots and tubers and nuts and oil seeds. Udaya (1996) and Smitha (1999) observed similar results among the farm

families and agricultural labourers of Thrissur district respectively.

It was observed that leafy vegetables, fruits, milk and milk products, meat, fish and egg were the food items used less frequently. Similar findings were reported by Augustine (1993), Shyna (1996) and Smitha (1999) among the labourer families belonging to different sectors in Kerala. Kaur and Man (1988) also observed negligible intake of green leafy vegetables, meat, fish and egg among low socio-economic groups. Though, various studies have reported higher consumption of fish among Keralities (Gopalan,1979, Lina and Reddy, 1989, Smitha, 1999, and Paul,2001) in the present study the families of agricultural labourers included fish in their diet only occasionally. This may be due to their poor economic status.

Though, advance meal planning helps better organisation and faster completion of household chores, in the present study majority of the families did not plan their meals in advance. Those who planned their meals, did it on the basis of food availability. Analysis of the meal pattern of the families indicated that all the households followed three meals a day pattern. Similar type of meal pattern was observed among the families of agricultural labourers of Kerala by Usha *et al.* (1990), Cherian (1992) Jayanthakumari (1993) and Smitha (1999). Rahman and Rao (2000) also reported three meals a day pattern among the families of Hyderabad.

Majority of the respondents did not maintain a routine time schedule for consuming meals. Karuna (1993), Ranganathan

(1996) and Jose (1998) observed a routine time schedule for consuming meals among the rural households of Kerala.

It was observed that all the families gave equal importance to all members with regard to food distribution. This result is in line with the findings of Jose (1998), Smitha (1999) Shyna (2001) among the labourer families in Thrissur district where as Usha *et al.* (1990), Seshadrinath (1993) and Udaya (1996) reported priority in food distribution for male members, children, head of the family and employed members among the families of labourers and farm women in Kerala.

The habit of drinking water indicated that all the families drank water without boiling. In concordance to this Ranganathan (1996) revealed that only few rural households of Kerala used boiled water for drinking. Udaya (1996) and Smitha (1999) reported that majority of farm families and agricultural labourer families in Thrissur district did not have the habit of drinking boiled water. This may be due to the ignorance about the hazards of water borne diseases. In contrast to this Jose (1998) reported that about 60 per cent of the families of casual labours in Thrissur used only boiled water for drinking.

Regarding the use of left over foods, the study showed that almost all the families consumed the left over foods. They did not include any raw foods except tomato and onion in the diet. In accordance to this Udaya (1996) among the farm families and Smitha (1999) among the agricultural labour families observed that majority reused the left over foods and did not eat any raw vegetables.

Cooking was done twice a day in majority of the households. It was also observed that 59.16 per cent of the families used aluminium and earthen pots as cooking vessels and ordinary hearth (89.17%) as cooking devices. Similar results were indicated by Sujatha (1990), Ranganathan (1996), Jose (1998) and Smitha (1999) among the labourer families of Trivandrum and Trichur districts of Kerala.

All the families used boiling and straining as the method of cooking cereals. In the case of other food stuffs also boiling method was found to be predominant. This finding is in line with the results published by Thomas (1989), Jayanthakumari (1993) and Smitha (1999) among the agricultural labourers in Thiruvananthapuram and Thrissur district of Kerala.

Salting and pickling was the common preservation methods used for mango and lime among 43.33 per cent of the families. Similar findings were reported by Udaya (1996), Jose (1998) and Smitha (1999) among the families of farm women and agricultural labourers in Thrissur district.

Most common storage methods adopted by the families were drying and storing in tight containers for cereals and pulses. This is in line with the results reported by Cherian (1992), Udaya (1996) and Smitha (1999) among the farm families and agricultural labourers in Thiruvananthapuram and Thrissur districts respectively.

An indepth study of the foods given during different special conditions indicated that foods like ragi, arrowroot and banana powder were the supplementary foods given to infants.

Similar results were observed by Cherian (1992) Jayanthakumari (1993), Udaya (1996) and Smitha (1999). No special food was given to pre school children, school going and adolescents. Bhat and Dahiya (1985) reported that majority of the preschool children in India received only ordinary home diets and their diet was deficient in many nutrients especially vitamins and minerals. Similar results were reported by Usha *et al.* (1990), Cherian (1992), Jayanthakumari (1993) and Jose (1998) among preschool children of labourer families .

During pregnancy and lactation women did not include any special food items in their diet. Similar findings were reported among the families of farm women (Udaya, 1996), casual labourers (Jose, 1998) and agricultural labourers (Smitha, 1999).

Consumption of non-vegetarian foods was preferred during feasts. During marriage, birthday, and other festive occasions like Onam and Vishu they preferred vegetarian foods. Payasam was the special food item prepared by all the families during festive days. Special food items were prepared on these occasions as a mark of enjoyment. Similar findings were reported by Sujatha (1990), Karuna (1993), Jose (1998), Mathan (1998) and Smitha (1999) among the labourers of various sectors in Kerala.

During illness liquid foods like rice gruel was widely consumed especially during fever, diarrhoea, chicken pox, measles and mumps. Non vegetarian foods and fried foods were avoided during diseased conditions. The result by Shyna (1996), Jose (1998) and Smitha (1999) among the labourer households in different parts of Kerala were in accordance with the results of this finding.



Regarding the food believes it was observed that though they have awareness about the food believes, they were not following that believes. But they were avoiding rice during fasting as their parents were doing.

### 5.3 NUTRITIONAL STATUS OF WOMEN AGRICULTURAL LABOURERS

The nutritional problems of developing countries are due to the fact that majority of the population subsist on an inadequate diet in terms of quality and quantity (Gopalan, 1991). Hence, determination of the food and nutrient intake of different groups is of utmost importance.

In the present study, anthropometry, actual food intake, clinical examination and biochemical estimation of blood for haemoglobin were reckoned as the major determinants of nutritional status of women agricultural labourers engaged in rice cultivation.

The mean weight and height of agricultural women labourers were found to be 43.1 kg and 149 cm respectively. Statistical analysis revealed that there is no significant change in the weight with change in height. This result was in line with the findings of Bimla (1995) and Udaya (1996) among the farm women of Hissar district of Haryana and Thrissur district of Kerala respectively. Smitha (1999) in her study among the women agricultural labourers of Thrissur district observed a mean body weight of 46.71 kg and a height of 151.60 cm. Among the Oriya women Mohapatra *et al.* (2001) reported a mean weight and height of 41.1 kg and 148.9 cm respectively.

Weight for age is the most sensitive index to evaluate the current nutritional status. In the present study it was observed that the mean body weight of 86.67 per cent of the respondents was lower than the reference body weight for an Indian reference woman suggested by ICMR (1990). Similar results were reported by Cherian (1992) and Smitha (1999) in their studies among the farm women and agricultural labourers. Average weight and height of fisher women was found to be below the ideal weight and height suggested for a reference woman by Karuna and Prema (1993). In contrast to this Jayanthakumari (1993) reported a higher weight for age among the farm women of Trivandrum district.

Body mass index describes the current nutritional status of adult. The body mass index of agricultural women labourers revealed that about 29.17 per cent were in the normal group and 24.17 per cent in the low weight group. The proportion of various grades of CED was found among 43.33 per cent of women. An almost similar result was reported by Cherian (1992) and Udaya (1996) among farm women. Smitha (1999) observed normal nutritional status among 50.67 per cent of the agricultural women labourers on the basis of BMI while mild and moderate chronic energy deficiencies were noted among 18 per cent and 3.33 per cent of women. Mohapatra *et al.* (2001) indicated various grades of CED among 52.2 per cent of Oriya women.

It was also seen that the mean value of weight and BMI decreased consistently with the severity of under nutrition from normal followed by CED grade I, II and III. However, grade

III women had taller stature by two and three cm than the normal. Grade III women had a taller stature by one cm than the grade I and II women. Mohapatra *et al.* (2001) among Oriya women also reported a similar observation of consistent decrease in weight and BMI with the severity of under nutrition from normals followed by Grade I, II and III. The authors also observed a taller stature among women of Grade II and III chronic energy deficiencies by one or two cm than the normals and Grade I CED women.

The relationship between anthropometric measurements in different grades of CED among women agricultural labourers in the form of correlation coefficient indicated that the correlation between weight and BMI was significant only for normal and grade III CED. Similar findings were reported among Oriya women by Mohapatra *et al.* (2001). In fact Baily and Luzzi (1973) Luzzi (1992) and Naidu and Rao (1994) reported that the reason for selecting BMI in estimating nutritional status of adult is due to the insignificant correlation of BMI with height.

Agarwal (1980) reported lower food consumption of rural population than the minimum requirement of physical sustenance required for healthy living. The actual food intake of the agricultural labourers revealed that the intake of all food groups except other vegetables was lower than the recommended levels suggested by ICMR (1984) for a balanced diet. In concordance to the results of this study, Seshadrinath (1993) and Seralathan *et al.* (1993) reported that the diets of women agricultural labourers and farm women respectively was deficient in all food groups recommended for a balanced diet. Usha *et al.* (1990) also reported a lower intake of all food groups except roots

and tubers among the farm families. However, Smitha (1999) reported a higher intake of cereals and other vegetables by the women agricultural labourers. The intake of green leafy vegetable was found to be very low. Lower intake of green leafy vegetables in the diet of women agricultural labourers of Kerala was reported by Rao *et al.* (1976), Pushpamma *et al.* (1982), NNMB (1989), Cherian (1992) and Smitha (1999). However, consumption of protective foods like pulses, green leafy vegetables, milk and milk products was found to be predominant in the dietaries of rural Indian population (NNMB, 1996).

With respect to the nutritional quality of the diet consumed by the women it was seen that the intake of all nutrients was significantly lower than the RDA suggested by ICMR (1990). Reduced energy consumption in the dietaries of the people in Southern and Northern India was reported by various authors, (Ajula *et al.*, 1983, Augustine, 1993, ICMR, 1990, Udaya, 1996 and Smitha, 1999). Deficiencies of protein, calcium, iron and retinol in the diet of women was reported by Udaya (1996) in her study among farm women.

As in the present study deficient intake of vitamin especially vitamin A through Indian home diets was reported by many studies (Ajula *et al.*, 1983, Bhat and Dahiya, 1985, Kaur and Sood, 1988, Agarwal, 1991, Cherian, 1992, Udaya, 1996 and Smitha, 1999).

Coefficient of variation was very high for majority of the food groups like pulses, green leafy vegetables, other vegetables, roots and tubers, fruits, fats and oils, meat and fish, egg and sugar and jaggery. It is due the fact that some families

were not taking these food groups, while in some other families intake of these food groups were high.

When the relationship between BMI and food intake was worked out a negative correlation between BMI and pulse intake was observed. It could be due to the fact that the respondents who consumed less amount of pulses, consumed high amount of cereals, other vegetables and roots and tubers.

The intake of roots and tubers varied with family size. As the family size increased the percapita intake decreased.

Clinical examination is the most effective measure to find out the nutritional deficiencies among individuals. The result of the present study indicated different clinical symptoms related to nutritional deficiencies like diffuse depigmentation in face, angular stomatitis, oedema in tongue, diffuse or local skeletal deformities, goitre, xerosis in skin, pale conjunctiva, koilonychia, dental carries among 10 to 67 per cent of respondents. In accordance to these findings incidence of corneal xerosis, cheilosis, spongy gum and dental carries were reported by Augustine (1993) in her study among the women engaged in stone breaking in Trivandrum district. Seralathan *et al.* (1993) reported severe anaemia and clinical symptoms of vitamin A and iron deficiencies among farm women of Coimbatore. Udaya (1996) also observed mild prevalence of angular stomatitis, bad gums and dental carries among the farm women. Angular stomatitis, bleeding gums and dental carries among women agricultural labourers was reported by Smitha (1999). In contrast to the result of the study, Jayanthakumari (1993) reported absence of clinical manifestations of nutritional deficiencies among farm women. Chandralekha

(1993) also reported no evidence of malnutrition or under nutrition among the women workers of tata tea estates of Kerala.

Nutritional anaemia has been reported to be a major micro nutrient deficiency prevalent among Indian women of reproductive age. Agarwal (1991) had reported that nutritional anaemia is characterised by inadequate erythropoeisis and reduced haemoglobin concentration which is due to inadequate supply of iron, folic acid and vitamin B2. The biochemical estimation of blood to assess the incidence of anaemia indicated lower haemoglobin level among all the respondents. The low haemoglobin level observed in this study may be due to decreased intake of green leafy vegetables which in turn resulted in a very low intake of iron.

This result is in accordance with the results of Cherian (1992) and Udaya (1996) among the farm women and Smitha (1999) among the women agricultural labourers.

#### **5.4 WORKING AND ENERGY EXPENDITURE PATTERN OF THE WOMEN AGRICULTURAL LABOURERS**

The position of Indian women in the unorganised sector is characterised by increasing concentration of the work force with no job security, arduous working condition and low wages (Sundari, 1990). Mukherjee (1992) reported that employment in informal sector is strenuous and provides low returns.

In the present study it was observed that the occupation for majority of male and female members was agriculture. Working pattern of the respondents was observed by

frequency of work, working time, working condition, work performance, work during different seasons and wage of the respondents.

In the present study it was observed that majority of the respondents (81.67%) used to get work for three days in a week. Lack of work in the field is the main reason for not going for work. Batliwala (1998) and Augustine (1993) reported that women agricultural labourers and women engaged in stone breaking worked almost six days in a week.

The work schedule of the respondents indicated that all the respondents spent about 7 ½ hours for agricultural operations in a day with half an hour interval in the morning and one hour interval in the afternoon. Augustine (1993) observed similar result among the women engaged in stone breaking. Nair (1990) has reported that women work for longer hours and contribute substantially to the family income. Sujatha (1990) and Smitha (1999) observed that agricultural labourers of Thiruvananthapuram and Thrissur districts spent 8-10 hours daily in the field.

Regarding the seasonality of work it was observed that during summer season they get work for 20 to 25 days in a month while in rainy season they get work only for up to 10 days. Cherian (1992) reported that majority of farm women in Thiruvananthapuram district get 20-24 days per month for agricultural operations.

Ploughing, levelling, irrigation, fertiliser application, storing of grains and straw and pesticide application were the

tasks assigned to men. Transplanting and weeding were the task performed by only women. Tasks like harvesting, threshing and winnowing were performed by both men and women.

Tanden and Dhondyal (1971) reported that farm wages vary from region to region depending upon the local custom, nature of work, standard of living and supply and demand for labour. Sharma and Sharma (1981) stated that the wage rates depended upon the labour availability and its demand in a particular locality.

Majority of the respondents get 40 rupees as wage per day. Balaraman (1985) revealed that on an average, the wages paid to female worker is roughly two third to three-fourth of the wages paid to male labour. In contrast to this, Sethi (1982) observed that the wages of an agricultural labourer in Punjab vary from five rupee to 20 rupee depending upon the nature of agricultural operations.

The energy expenditure pattern revealed that all the respondents had negative energy balance. In concordance to this result Cherian(1992) and Smitha(1999) also reported negative energy balance among the farm families in Trivandrum and agricultural labourer families in Thrissur district respectively. The negative energy balance of the respondents may be due to their lower food intake and heavy work load.

The results of the study revealed poor nutritional status among the women agricultural labourers. Lack of intake of balanced and nutritious food was found to be the main reason for poor nutritional status. Moreover majority of respondents were



illiterate and so they were not aware about the importance of the intake of nutritious food. The study drew attention to the need for nutrition education programme in order to improve awareness among poor women.

Along with awareness training programme, proper follow-up activities should also be done by the training agency to ensure good health status among the agricultural labourers through intake of proper low cost balanced nutritious food.

The socio-economic profile of the agricultural women labourers indicated the discrimination women face through larger wage rate. This can be identified as one of the important reasons for low purchasing power among them. The concerned authorities should be ready to implement necessary measures for bringing the rule of equal pay in the agricultural labourer sector.

The study revealed the high rate of negative energy balance among the agricultural women labourers due to poor energy intake and high energy expenditure. High work load was the one which leads to high energy expenditure. So, farm mechanisation with the use of agricultural implements will reduce the work load and there by improve the nutritional status of agricultural women labourers.

# Summary

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## SUMMARY

Agriculture is the backbone of Indian economy and is the main stay of livelihood to majority of people in India. Women agricultural labour is defined as any women who is earning livelihood through engaging in paid farm work. In a predominantly agricultural society, women play crucial role along with men in agriculture and participate at every stage of this activity.

The present study entitled nutritional profile of women agricultural labourers in rice cultivation was carried out among 120 women labourers in Palakkad district.

The main objective of the study were:

1. To assess the socio economic status of agricultural labour families.
2. To assess the food consumption pattern of the agricultural labour families.
3. To assess the nutritional status and working conditions of the agricultural women labourers.
4. Find out the time and energy expenditure pattern of the agricultural women labourers.

The study was carried out to throw light on the socio economic and dietary habits of the families and also the nutritional status of the women agricultural labourers. The working pattern

and energy expenditure pattern of the respondents were also calculated.

Information regarding socio economic condition of the families indicated that majority of the families (80%) were of nuclear type and 64.17 per cent of the families were in the size group of four to six.

Educational status of adults showed that 60.15 per cent of the male and 78.09 per cent female members were literate. Majority (79.35 %) were engaged as agricultural labourers which included 77.64 per cent male and 80.90 per cent female members.

Most of the family members of the respondents (90%) owned upto 10 cents of land. The crop cultivation details indicated that only 14.17 per cent of the families cultivated various types of crops and out of them only a few (23.53%) received income from it. Similar trend was observed in the domestication of animals also.

The monthly income of the families (93.34%) varied from Rs. 500 to Rs. 2500.

About 25 per cent of the families had taken loans from cooperative society or bank mainly for purposes like agriculture, house construction, marriage, business, buying vehicles or and domestic animals.

Regarding the monthly expenditure pattern, majority of the families spent maximum proportion of their income on food items. The expenditure on clothing, shelter, transport, recreation, health, fuel and luxury and personal items were less than 20 per cent. About 48 per cent and 49 per cent of the families did not spend money for education and electricity respectively. None of the families had the habit of saving money.

All the families had own houses with brick as the wall material and with tiled roof and two to three rooms and separate kitchen. Majority of the families depended on public tap for drinking water and had no proper lavatory and drainage facilities. Recreational facilities and electricity facilities were found to be present in majority of the families.

The use and source of fuel indicated that majority (88.33%) used wood as fuel and 76.67 per cent of families collected wood from the surroundings.

Health care facilities revealed that majority of the families (77.5%) depended on primary health centre of the locality, private hospital as well as the district hospital for their medical care.

Contagious diseases like mumps, measles and chicken pox were found during the past one year.

Regarding social participation, only few (40.84%) were found to be the members of Ayalkootam or Gramasabha and majority did not attend the meetings regularly.

All the families surveyed were non vegetarians and their staple food was rice.

Nearly 55 per cent of the respondents spent 20-30 per cent of their food expenses on cereals and majority of the families spent less than five per cent of their expenditure on other food items like pulses, other vegetables, roots and tubers, milk and milk products, meat, fish, egg, fats and oils, nuts and oil seeds, sugar and jaggery and spices and condiments. Expenditure for the purchase of green leafy vegetables and fruits were found to be nil among the families.

Cereals, fats and oils, spices and condiments and sugar and jaggery were the most frequently used food items, pulses, other vegetables, roots and tubers, nuts and oil seeds were medium frequently used and green leafy vegetables, fruits, milk and milk products, meat, fish and egg were the less frequently used food items.

Details regarding the meal pattern of the families revealed that all the families had three meal a day pattern. Only few families planned their meals in advance on the basis of food availability.

Nobody had the habit of drinking boiled water and not included any raw vegetables in their diet. Almost all the families reused the left over foods.

Majority cooked food twice a day and used aluminium and earthen pot for cooking. Ordinary hearth was the cooking device among majority of the respondents.

Boling was the commonly practised cooking method with variation of it like boiling and straining, boiling and absorption and boiling or shallow fat frying.

Pickling was found to be the preservation method adopted by 43.33 per cent of the families. Most common storage methods were drying and storing in tight containers for cereals and pulses.

The diet during different stages indicated that special foods were given during infancy. No special food was prepared for preschool children, adolescents, pregnant and lactating women.

Special foods were prepared during marriage, birthday, death ceremony and other festive occasions.

Diet modification during diseased conditions was observed. Semisolid foods like rice gruel was included during diseases like fever, diarrhoea, chicken pox, measles and mumps.

The nutritional status of the respondents were assessed through anthropometric measurements, food weighment survey, clinical examination and biochemical estimation.

Anthropometric measurements indicated that the mean weight (43.1kg) of the respondents was statistically lower than the body weight suggested by ICMR for a reference Indian woman. The height of the respondents varied from 140.1 cm to 165 cm. Body Mass Index (BMI) showed that only 29.17 per cent of the labourers were with normal BMI and 43.33 per cent had different grades of CED.

Actual food intake of the respondents indicated that except other vegetables, all food groups were lower than the RDA. The comparison of mean nutrient intake with the RDA indicted that the intake of all the nutrients was lower than the RDA.

Clinical examinations showed nutritional deficiencies like diffuse depigmentation in face, angular stomatitis, oedema in tongue, diffuse or skeletal deformities, goitre, xerosis in skin, pale conjunctiva, koilonychia and dental carries among majority of women agricultural labourers.

Biochemical examination of blood showed that the haemoglobin level of all the respondents were lower than the normal haemoglobin level of 12g/dl. None of the respondents had acceptable iron status on the basis of haemoglobin content of blood.



Majority (98%) of the respondents used to get work for three days in a week and all the respondents worked in agricultural operations for 7 ½ hours in a day. Majority started their work at 7 am. and stopped at 4 pm. About 81.67 per cent worked only under one farmer.

Transplanting and weeding were the main tasks performed by only women while men and women performed the tasks like harvesting, threshing and winnowing.

Most of the agricultural labourers used to get 20-25 days of work during summer season and upto 10 days during rainy season. About 93.33 per cent of the respondents had sickle as an agricultural implement. The daily wage of 93 per cent of the labourers varied from Rs. 40 to 50 per day.

Daily energy expenditure pattern of the labourers indicated that all of them had negative energy balance when the daily energy intake was compared with daily energy expenditure.

# **Bibliography**

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## BIBLIOGRAPHY

- Absan, R.M. 1986. Study of women's role in agriculture (Bangladesh). *Women in Agriculture* (eds.Mikila,T.and Pradumam,S). Proceedings of the workshop on women in agriculture, September 3,1986. Lonilla, Bangladesh, p.25
- Agarwal, A.N. 1980. *Indian Agricultural Problems, Progress and Prospects*. Vikas Publishing House Pvt. Ltd., Uttar Pradesh, India, p .110
- Agarwal, K.N. 1991. Functional consequences of nutritional anaemia. *Proc. Nutr. Soc. India* **37**: 127-130
- Ajula, P., Miglani, S. and Singh, A.J. 1983. A comparative study on the nutrient intake among different income, occupation and family size categories in rural areas of Punjab. *Indian J. Nutr. Dietet.* **20**: 344-349
- Alam, D.S. 2001. Maternal and child nutrition in rural Bangladesh; special reference to the effect of dietary fat supplementation on vitamin A status. *Int. J. Epidemiol.* **27**: 231-237
- Alderman, H. and Garcia, M. 1992. Food security and health security: explaining the levels of nutrition in Pakistan - policy, research, and experimental affairs. *Working papers, Agriculture and Rural Development*, World Bank, Washington, **865**: 48-55
- Alva, M. 1998. Women in India. *Manorama year book*. (eds. Mathew, K.M., Mathew, M., Mathew, P and

Narayanan, K.C). Thirty eight years of publication. Malayala manorama press, Kottayam, p.403

Anil, S.S., Geevargheese, P.I. and Anil, L. 2001. Socio personal and socio economic profile of dairy farmers in Kerala. National Conference on Strategies for Safe Food Production, 22 November 2001. Association of Food Scientists and Technologists, Trichur. *Abstract*: 30

\*Anssary, F., Keshavarz, S.A., Djazayeri, A., Mahmoody, M., Djarollahi, N. and Kyghobady, K. 1999. Prevalence of iron deficiency anaemia among mothers living in rural areas of Kohrram - abad city, Iran and some factors affecting it. *Iranian J. pbl. Health* **28**: 175-184

\*Antelman, G., Misamanga, G.I., Spiegelman, D., Urassa, E. J. and Narh, R. 2000. Nutrition factors and infectious disease contribute to anaemia among pregnant women with human immuno deficiency virus in Tanzania. *J. Nutr.* **130**: 1950-1957

Arora, A. 1992. A study on the food and nutrition; nutritional status in Gwalior city. *Indian J. Nutr. Dietet.* **29**: 321-323

\*Arora, H.A. 1990. Demographic pressure and the dynamics of agrarian structures in the Magharch. *Mondes en Dev.* **18**: 9-17

Ashmore, H.R. 1996. Livestock, nutrition and intra household resource control in Uasin Gishu district, Kenya. *Human Ecol.* **24**: 191-213

- Ashmore, H. R. and Curry, J. J. 1994. Diet, nutrition and agricultural development in Swaziland - household economics and demography. *Ecol. Fd Nutr.* **33**: 107-121
- Augustine, J. 1993. Factors influencing the working efficiency of women engaged in stone breaking with special reference to nutritional status. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.121
- Babu, R.V.S. 1989. Working women and children in resettlement colonies of Delhi. *Social Welfare* **35**: 115-116
- Baily, K.W. and Luzzi, F.A. 1973. Use of body mass index of adults in assessing individual and community nutritional status. *Bull. Wld Health Org.* **73**: 165-174
- Balaraman, S.N. 1985. Sex discrimination in farm wages in Tamil Nadu. *Indian J. agric. Econ.* **40**: 35-39
- Bass, M. A., Wakefield, L. and Kolar, K. 1979. *Community Nutrition and Individual Food Behaviour*. Burgess publishing company, Minesota, p.153
- Batliwala, S. 1998. Field of rice: health hazards of women and inborn children. *Manushi* **48**: 28-29
- Begum, M.R. 1991. *A Textbook of Foods, Nutrition and Dietetics*. Steriling Publishers Pvt. Ltd., New Delhi, p.225
- \*Behrumram, J.R. and Deolalikar, A.B. 1986. Seasonal demands for nutrient intakes and health status in rural South India. *Fertility Determinants Res. Notes*. Population Council, U.S.A. **13**: 4-9

- Bhat, C.M. and Dahiya, S. 1985. Nutritional status of pre-school children in Gangua village of Hissar district. *Indian J. Nutr. Dietet.* **22**: 206-214
- Bigsten, A., Braun, V. J. and Von, B.J. 1992. Emerging features of absolute poverty and strategies for its rapid reduction. *Rur. Dev. Stud.* **29**: 41-51
- Bimla, R. 1995. How healthy are village women. *Social welfare* **42**: 16-17
- Bisht, B.S., Bhuchar, S.K., Pant, P., Kothiyari, B.P. and Palni, L.M.S. 2000. The pivotal role of women in the hills: gender analysis in Arath village in Uttarpradesh, Central Himalayas, India. XXXIII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract*: 68
- \*Borrelli, R., Cole, T.J., Blasé, D. and Contaldo, F. 1989. Some statistical considerations on dietary assessment methods. *Eur. J. Clin. Nutr.* **43**: 453-463
- Brahman, G.N.V. 1999. How nutritionally sound are our elderly? *Nutrition* **33**: 13-21
- Brahman, G.N.V., Sastry, J.G. and Rao, N.P. 1987. The urban people - their dietary and nutritional status. *Nutrition* **21**: 14-22
- Butt, S.A., Mahmood, T. and Ludlow, S.E. 1989. Food and nutrition in Pakistan. *J. rur. Dev.* **12**: 78-81

- Census of India, 1991. Provisional population totals, series-1, paper-1, Registrar General and Census Commissioner of India, Government of India, pp.25-26
- Chadha, S.L., Gopinath, N., Katyal, I. and Hawat, S.S. 1995. Dietary profile of adults in an urban and rural community. *Indian J. med. Res.* **101**: 258-267
- Chakravarthy, I. and Ghosh, K. 2000. Micro nutrient malnutrition - present status and future remedies. *J. Indian med. Ass.* **98**: 539-542
- Chandralekha, V. 1993. Study of nutritional status of women workers in the Tata tea estates of Kerala. Souvenir and Abstracts of IV<sup>th</sup> World Congress on Clinical Nutrition, 2-5 October 1993. Malabar Hotel, Cochin, Little Flower Medical Research Centre, Angamali. *Abstract*: 78
- Cherian, L. 1992. Food consumption and energy expenditure pattern of agricultural labourers of Trivandrum district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.133
- Choudhary, B.N. 1990. Strategies for development of farm women - their roles and status. Workshop on women in agriculture. October 29<sup>th</sup> to November 1<sup>st</sup> 1990. National Institute of Rural Development, Hyderabad. *Back ground papers*, p.1-21
- Christin, P., West, K. P., Katz, S.K., Shrestha, S.K. and Pradham, E.K. 1995. Night blindness of pregnancy in rural Nepal - nutritional and health risks. *Int. J. Epidemiol.* **27**: 231-237

- Cooper, A. and William, C.H. 1982. Nutritional assessment of children. *Am. J. Nutr. Dietet.* **35**: 119-122
- \*Daphna, W.N. 1979. Biochemical appraisal of vitamin nutritional status in man. *J.Am. med. Ass.* **18**: 49-52
- Desai, I.D., Doell, A.M., Offiwati, S.A., Bianco, A.M., Van, Y.S., Desai, M.I., Jansen, E. and Oliveira, J.E.D. 1989. Nutritional need and assessment of rural agricultural migrants of Southern Brazil: designing, implementing and evaluating a nutrition education programme. *Wld Rev. Nutr. Dietet.* **61**: 64-131
- Deshpande, S.S., Mishra, A., Mishra, M. 2001. Nutritional profile of farm women of Madhya Pradesh and impact of nutrition education. XXXIV Annual Meeting of Nutrition Society of India, December 5-6 2001. Bhopal. *Abstract*: 65
- Devadas, R.P., Anuradha, V. and Mathai, J. 1977. Energy intake and expenditure of selected adolescent girls. *Indian J. Nutr. Dietet.* **14**: 31-32
- Devadas, R.P., Anuradha, V. and Rani, A. J. 1974. Energy intake and expenditure of selected manual labourers. *Indian J. Nutr. Dietet.* **11**: 279-281
- Devadas, R.P. and Easwaran, P. 1986. Intra family food intake of selected rural households and food consumption pattern of pregnant women. *Indian J. Nutr. Dietet.* **23**: 343-347



- Devadas, R.P. and Kulandaivel, K. 1975. *Handbook of Methodology of Research*. Sri Ramakrishna Mission Vidhyalaya Press, Coimbatore, p.154
- Devi, L.N. 2000. Nutritional and health impact of substituting green gram by soya products in school lunch programme in Trichur district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.120
- Devi, T.R. and Sarojini, G. 2000. Food and nutrient intake, deficiencies and KAP of pregnant and lactating women belonging to dairy vs non dairy families. *J. Res. ANGRAU*. 28: 65-68
- Dungarwal, M. and Choudhary, M. 2000. Energy balance of farm labourers. XXXIII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract: 27*
- Dungarwal, M. and Choudhary, M. 2001. Nutritional status of farm labourers. XXXIV Annual Meeting of Nutrition Society of India, 5-6 December 2001. All India Institute of Medical Sciences, New Delhi. *Abstract: 57*
- Farm Guide. 2002. *Selected indicators of progress in agriculture sector*. Farm Information Bureau, Thiruvananthapuram, p.4
- Farzana, C. and Manay, S. 2000. Dietary and nutritional adequacy of rural households. XXXIII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract: 20*

- \*Foeken, S.P. and Tellegon, N. 1994. Tied to the land, household resources and living conditions of labourers on large families in Trazoia district, Kenya. *Afr. Stud. Centre Res. Ser.* 1: 157
- \*Ge, K. 1995. Dietary pattern and physical development in China based on the 1992 national nutrition survey. *Asia Pacif. J. Clin. Nutr.* 4: 19-23
- Genecaga, H. and Huddleston, B. 1986. Explorations of food consumption and nutritional status: Turkey. *Fd Policy* 23: 80-93
- \*Getaburn, Z., Urga, K., Ganebo, T. and Nigatu, A. 2001. Review of the status of malnutrition and trends in Ethiopia. *Ethiopian J. Health Dev.* 15: 55-74
- Gokhale, M.K., Shobba, R. and Kanade, A.N. 2001. Energy costs of activities for women in rural India. XXXIV Annual Meeting of Nutrition Society of India, 5-6 December 2001. All India Institute of Medical Sciences, New Delhi. *Abstract*: 90
- Gopalan, C. 1979. Tapioca-tuber of the tropics. *Nutrition* 13: 2-8
- Gopalan, C. 1991. The national nutrition scene: the changing profile. *Proc. Nutr. Soc. India* 37: 10-11
- Gopalan, C. 2001. Early childhood mal nutrition in India - inter state differences. *J. NFI Bull.* 22: 5-8
- Gopalan, C. and Aeri, B.T. 2001. Strategies to combat under nutrition. *Econ. Political Weekly* 36: 3159-3169

- Gopalan, C., Sastri, B.V.R. and Balasubramanian, S.C., 1989. *Nutritive value of Indian foods*. National Institute of Nutrition, Hyderabad, p.156
- Gopaldas, T. and Seshadri, S. 1987. *Nutrition Monitoring and Assessment*. Oxford university press, Delhi, p.120
- Gore, A.P., Tilve, S. and Kulkarni, M. 1977. Nutritional status of tribes in the Indravati river basin. *Indian J. Nutr. Dietet.* **14**: 167-172
- Grabowsky, R. 1987. The new technology and reform: a-synthesis. *Indian J. agric. Econ.* **42**: 52-66
- Grover, D.K. and Grover, I. 1993. Farm women face wage and job discrimination in North Western India. *Indian Fmg* **43**:9-10
- Gupta, S.P. 1987. *Statistical Method*. Sultan chand and sons, New Delhi, p.310
- Gupta, S.P. 1999. Nutrition: an Indian perspective. *Indian J. pbl. Health* **43**: 11-16
- Gurumoorthy, T.R. 2000. Self help groups empower rural women. *Kurukshethra* **48**: 36-40
- Haemalatha, S. 1998. Gender analysis of rice farmers in Trivandrum district. M.Sc. (Ag.) thesis, Kerala Agricultural University, Trichur, p.143
- \*Haidar, J., Nekatibeb, H and Virga, K. 1999. Iron deficiency anaemia in pregnant and lactating mothers in rural Ethiopia. *E. Afr. med. J.* **29**: 618-622

- \*Hailu, W. 1990. Agricultural system household activities and family nutrition, Sidarmia province, Ethiopia. *E. Afr. med. J.* **20**: 73-105
- Harris, B.S., Gillespie, M. and Pnior, J. 1990. Poverty and malnutrition at extremes of South Asian food systems. *Econ. Political Weekly* **25**: 1901-1913
- Hemalatha, G., Chandrasekhar, U. and Sylvia, M. 2000. Iron profile of working women in comparison with housewives. *Indian J. Nutr. Dietet.* **37**: 319-324
- \*Hinderacher, S.G., Olsen, B.E., Bergsjo, P., Lie, R.T and Gasheka, P. 2001. Anaemia in pregnancy in the highlands of Tanzania. *Acta Obstetricia et Gyneiologica Scandinavica* **80**: 18-26
- Hua, Z. and Hage, H. 2002. Longitudinal changes in nutrient intake in the Melbourne Chinese. *J. pbl. Health Nutr.* **5**: 433-439
- Indian Council of Medical Research. 1984. *Recommended Dietary Intakes for Indians*. Indian Council of Medical Research, New Delhi, p.103
- Indian Council of Medical Research. 1990. *Nutrient Requirements and Recommended Dietary Allowances for Indians*. National Institute of Nutrition, Hyderabad, p.129
- Indira, V. 1993. Nutritional status and dietary habits of Irulas of Attappady. Ph.D thesis, Kerala Agricultural University, Trichur, p.285

- Ingle, P.O. and Khai, D.N. 1987. Personal and socio economic status of agricultural women labourers. *Maharashtra J. Ext. Education* **6**: 23-27
- Jayalakshmi, K. 1998. The empowerment of women in India. *J. Rur. Dev.* **17**: 803-805
- Jayanthakumari, S. 1993. Food consumption pattern of selected farm families in Thiruvananthapuram district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.102
- Jejuverma, M.K. 2002. Role of women in agriculture. *The New Indian Express*, Coimbatore, March 14, p.4
- Jelliffee, D.B. 1966. *The Assessment of Nutritional Status of the Community*. WHO monograph series No. 33. World Health Organisation, Geneva, p.133
- Jhurani, K. 1985. *Women Participation and Development: a case study from rural Punjab*. Occasional paper No.6. CWSD, New Delhi, pp.13-43
- Jose, M.P. 1998. Maternal employment and nutritional status of preschool children. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.154
- Jose, M.P. and Indira, V. 2000. Maternal employment and nutritional status of preschool children. *Indian J. Nutr. Dietet.* **37**: 110-115
- Joseph, S. 1991. Girl child workers - A victim invisible. *Kurukshethra* **39**: 11-14

- Josserand, H.P. 1985. Rural food consumption and effect of agricultural policies: a methodology. *Diss. Abstr. int. Humanities* **45**: 2200
- Jyothi, G. and Sheela, K. 1992. Impact of maternal employment on child care, time and other activities. *Indian J. Nutr. Dietet.* **30**: 105-108
- Kamath, S. 1986. *Nutritional Assessment in Health Assessment*. Third edition. The C.V. Mosby Company, St. Louis, Tornoto, Princeton, p.132
- Karuna, M.S. 1993. Nutritional status of women engaged in fish vending in Thiruvananthapuram district. Ph.D thesis, Kerala Agricultural University, Trichur, p.128
- Karuna, M.S. and Prema, L. 1993. Factors influencing the nutritional status of women engaged in fish vending in Trivandrum district, Souvenir and Abstracts of IV<sup>th</sup> World Congress on Clinical Nutrition, 2 – 5 October 1993. Malabar Hotel, Cochin, Little Flower Medical Research Centre, Angamali. Abstract: 73
- Kaur, I.P. and Man, S.K. 1988. Food expenditure and nutrient intake of the low socio economic families in Punjab. *Proc. Nutr. Soc. India* **34**: 119-124
- Kaur, I.P. and Sood, B. 1988. Dietary pattern and nutritional status of spinning mill workers. *Indian J. Nutr. Dietet.* **25**: 315-319
- \*Khadka, N.B. 2001. Vitamin A deficiency, fruit and vegetable consumption and nutrition education: villagers

perceptions in Nepal. *Aust. J. Nutr. Dietet.* **58**: 186-191.

Khan, A.R. and Sharma, V.P. 1971. Farmers respond to crop planning. *Indian J. Ext. Education* **7**: 58-59

\*Kumar, P. 1996. Long term change in dietary pattern and food demand in Asia. *Palawija News* **13**: 1-2

\*Labadarios, D. 2001. The national food consumption survey-children aged 1-9 years. *S. Afr. J. Psychiatry* **14**: 62-66

\*Latafat, T., Hakeem, M. H. and Khan, A.B. 2000. Clinical efficacy of Kushta - e - Faulad and Sharbat - e - Faulad in iron deficiency anaemia during pregnancy. *Hamdard Medicus* **43**: 25-29

Lina, S. and Reddy, P.R. 1989. Development and evaluation of low cost indigenous food mixes of preschoolers and formulation of diet. *Indian J. Nutr. Dietet.* **21**: 241-250

Liu, D., Kothr, E.D. and Fronters, G. 1992. Strategies to combat iron deficiency anaemia in China. *Ecol. Fd Nutr.* **30**: 22-36

\*Longhurt, R. 1984. The energy trap: world nutrition and child malnutrition in Northern Nigeria. *Cornell int. Nutr. Monograph Ser.* **7**: 101-104

\*Luzzi, F.A., Sette, S., Franklin, M. and James, W.P.T. 1992. A simplified approach of assessing chronic energy deficiency. *Eur. J. Clin. Nutr.* **46**: 173-186

- Manjulatha, C. 1993. Farm women needs a better deal. *Indian Fmg* **43**: 11-12
- Manorama Year Book. 1996. Thirty first year of publication, Malayala Manorama, Kottayam. p.240
- Manorama Year Book. 2001. Thirty sixth year of publication, Malayala Manorama, Kottayam. p.320
- Mari, J. 1985. Individual dietary survey, purpose and methods. *Wld Rev. Nutr. Dietet.* **13**: 105-161
- Mary, A.B.F. 1986. Nutrition, health and population in strategies for rural development. *Econ. Dev. Cultural Change* **26**: 1-23
- Mathan, M.M. 1998. Nutritional status and intelligence of preschool beneficiaries of ICDS and non-beneficiaries of Trichur district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.152
- Mathuravalli, S.M.D., Manimegalai, G. and Jayalakshmi, N. 2002. Effect of socio economic status on nutritional status of pregnant women and pregnancy outcome in selected urban slums of Madurai district. *Indian J. Nutr. Dietet.* **39**: 350-356
- \*McLaren, D.S., Johnston, E.E., Lampl, M., Martorell, R., Waterlow, J.C., Hansen, J.D.L. and Mora, J.O. 1984. Forms and assessment of protein energy malnutrition. *In: malnutrition and behaviour - critical assessment of key issues* (eds. Brozek, J. and Schurch, B). Nestle Foundation, Switzerland, p.130



- \*Meda, N., Chevalier, P. and Daude, M. 2000. Ocular manifestations of vitamin A deficiency in rural areas of Burkina Faso. *J.med. trop.* **60**: 57-60
- Meena, J., Vijaya, N. and Reddy, S.N. 2000. Food and nutrient intake, anthropometric measurements and haemoglobin status of lactating women in urban and rural areas of Parbhani district. *Indian J. Nutr. Dietet.* **37**: 288-295
- Mellor, J.W. 1984. The world food equation: interrelations among development, employment and food consumption. *J. econ. Lit.* **22**: 531-574
- \*Min, Z., Binn, C. W. and Lee, A.H. 2002. Dietary pattern and nutrient intake of adult women in South-East China: a nutrition study in Zhejiang province. *Asia Pacif. J. Clin. Nutr.* **11**: 13-21
- Minocha, A.C. 1995. Globalisation of Indian agriculture. *Econ. Political Weekly* **30**:833
- Mohapatra, A., Geddam, J.J. R., Marar, N., Mallick, G., Murmu, B., Acharya, A.S., Bulliya, G. and Satyanarayana, K. 2001. Nutritional status of rural Oriya women from drought affected Kalahandi district of Orissa. *Indian J. Nutr. Dietet.* **38**: 403-404
- Moorthy, R.V., Lakshmikantham, A., Naidu, N. and Mohanram, M. 1983. Nutrition profile and scope for nutrition education of industrial workers. *Indian J. Nutr. Dietet.* **20**: 119-122
- Mor, S. D. P. 2001. Women woes. *Manushi* **25**: 44-47

- Mrunalini, A. 1992. Quality of worklife of women in home and farm. M.Phil thesis, Avinashlingaim Deemed University, Coimbatore, p.178
- Mukherjee, P. 1992. Developing new strategy for women's development. *Kurukshethra* 9: 19-23
- \*Muntiwiler, M., Shelton, R. and Bourke, R.M. 2000. Survey of nutrition and protein intake in rural families in Eastern Highlands Province. *Food and Nutrition* (eds. Allen, M.G. and Salisbury, J.G). *Proceedings of the Papua New Guinea Food and Nutrition 2000 Conference, 26-30 June 2000*. PNG University of Technology, Papua New Guinea, pp.432-442
- Nagammal, K. 1989. Impact of ragi based food supplement on the nutritional status of selected preschool children. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.171
- Naidu, A.N. and Rao, N.P. 1994. Body mass index: a measure of the nutritional status in Indian populations. *Eur. J. Clin. Nutr.* 48: 131-140
- Nair, R. 1990. Farming system development: synthesising indigenous and scientific knowledge system. *Agric. hum. Values* 8: 25-26
- National Institute of Nutrition, 1983. A Manual of Laboratory Techniques (eds. Raghuramulu, N., Nair, K.M. and Kalyasundaram, S). Indian Council of Medical Research, Hyderabad, p.140

- National Institute of Nutrition. 1984. Nutritional surveys in urban slums. *Nutr. News* **5**:5-8
- National Institute of Nutrition, 1991. Maternal body mass index and birth weight. *Nutr. News* **12**: 2-5
- National Institute of Nutrition, 1993. Women's work and the impact on health and nutrition. *Proc. Nutr. Soc. India* **19**:21-25
- National Institute of Nutrition, 1995. *The impact of women's work on child and maternal health*. A summary report of the women's work and child development network. National Institute of Nutrition, Hyderabad, p.15
- National Institute of Nutrition. 1996. *Energy Cost of Women's Work*. Annual Report No.15. National Institute of Nutrition, Hyderabad, p.29
- National Nutrition Monitoring Bureau. 1989. *Children and women in India - A situation analysis*. Report of NNMB surveys. National Institute of Nutrition, Hyderabad, p.37
- National Nutrition Monitoring Bureau. 1996. *Nutritional Status of Rural Population*. Report of NNMB surveys. National Institute of Nutrition, Hyderabad, p.11
- Nayga, R.M. 1994. Effects of socio economic and demographic factors on consumption of selected food nutrients. *Agric. Resour. Econ. Rev.* **23**: 171-182

- Nazmul, H. and Ahmed, K. 1986. House distribution of energy intake and its relationship to socio economic and anthropometric variables. *Fd Nutr. Bull.* **8**: 3-7
- Nicol, A. and Phillips, R. 1976. Nutrition levels and economic growth: some emperical measures. *J. econ. Issues* **7**: 437-458
- Panicker, P.G.K. 1979. Employment, income and food intake among selected agricultural labour households. *Econ. political weekly* **14**: 1464-1470
- Pasricha, S. 1979. An assessment of reliability of the interview method of diet survey as applied to Indian communities. *Indian J. med. Res.* **47**:207-213
- Paul, S. 2001. Food habits and nutritional profile of adolescents. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.120
- \*Perez, J.J.C. and Alamaguir, G. 2002. Iron stores in low-income pregnant Mexican women at term. *Archives med. Res.* **33**: 81-84
- Posner, B.M., Munely, M., Smigelski, S.S.C., Cupples, L.A., Cobb, J.L., Schaefer, E., Miller, D.R. and Agostino, R.B. 1992. Comparison of techniques for estimating nutrient intake. *Epidemiology* **94**: 626-830
- Prema, K. 1978. Pregnancy and lactation: Some nutritional aspects. *Indian J. med. Res.* **68**: 70-79
- Prema, L., Menon, A.G.G. and Aiyer, R.S. 1982. Changing the dietary habits of a tribal population through the

introduction of new food crops. *Phillip. J. Nutr.* **35**: 60-62

Pushpamma, P., Geervani, P. and Devi, N.L. 1982. Food intake, nutrient intake and anthropometry of adolescents in Andhrapradesh. *Indian J. med. Res.* **75**: 61-67

Rahman, M. and Rao, V.K. 2000. Variation in dietary pattern and nutrient intake by economic status. *Indian J. Nutr. Dietet.* **37**: 172-180

Rahman, M. and Rao, V.K. 2001. Effect of socio economic status on food consumption pattern and nutrient intake of adults - a case study in Hyderabad. *Indian J. Nutr. Dietet.* **38**: 292-300

Rajalakshmi, R. and Gayathri, N. 2001. Economic and health status of women employed in magnesite - industry at Salem district. XXV Indian Social Science Congress, 26-30 December 2001. University of Kerala, Thiruvananthapuram. *Abstract*: 42

Rajkumar, H. and Premakumari, S. 1999. Health index of selected working women of Coimbatore in relation to occupational hazards. XXXII Annual Meeting of Nutrition Society of India, 25-26 November 1999. National Institute of Nutrition, Hyderabad. *Abstract*: 38

Rajkumar, H. and Premakumari, S. 2000. Health and nutritional status of working women in Coimbatore and their exposure to occupational hazards. *Indian J. Nutr. Dietet.* **37**: 381-390

- Rajuladevi, A. 2001. Food poverty and consumption among landless labour households. *Econ. political weekly* **36**: 2656-2664
- \*Ramalho, A., Saunders, C., Paiva, F., Accioly, E., Cardoso, L. and Deo, E. 2001. Vitamin A status of mothers and newborn infants and maternal anthropometric status. *J. Revista de Ciencias Medicas* **10**: 5-10
- Ramamurthy, T.K. and Belawadi, R. 1966. Women in India. *Nutrition* **3**: 6-8
- Ramya, M. and Devaki, B. 2000. Body iron status of women construction workers in Tirupati and their work performance. XXXIII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract*: 46
- Ranganathan, L. 1996. Nutritional status of women engaged in the coir industry. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.385
- Rao, D.H. and Vijayaraghavan, K. 1996. Anthropometric assessment of nutritional status. *Textbook of Human Nutrition* (eds. Bamji, M.S., Rao, N.P. and Reddy, V.). Oxford and IBH publishing Co. Pvt. Ltd., Delhi, pp.148-162
- Rao, K.V. 1975. Diet survey by weighment method. A comparison of reference periods. *Indian J. Nutr. Dietet.* **12**: 9-10
- Rao, N.R., Syamalamba, C.H., Ahmed, M. and Reddi, Y.R. 1976. Nutritional status of residential school children in

Andhrapradesh - A rural study. *Indian Paediatrics*  
**13:** 249-353

Rao, P.N., Ramnath, T. and Sastry, G.J. 1986. Diet and nutrition  
 in urban areas. *Proc. Nutr. Soc. India* **32:** 1-9

Rao, V.K., Pant, K.C. and Balakrishnan, N. 1981. Pattern and  
 trends on food production and needs in India.  
*Dimensions of Development Planning* (eds. Panday,  
 D.C. and Tiwari, P.C.). Criterion publishing, New  
 Delhi, pp. 415-431

\*Reaburn, J.A., Krohdle, M. and Lau, D. 1979. Social  
 determinants in food selection. *J. Am. Dietet. Ass.* **74:**  
 637-641

Reddy, V., Rao, N.P., Sastry, J.G. and Kashinath, K. 1993.  
*Nutrition Trends in India.* National Institute of  
 Nutrition, Hyderabad, p.120

Robinson, C.H. 1975. *Basic Nutrition and Diet Therapy.* Mac  
 Millan Publishing House, New York, p.240

Robinson, C.H. 1990. *Normal and Therapeutic Nutrition.* Mac  
 Millan Publishing House, New York, P.168

\*Rodeguize, S., Bilanco, A., Cunningham, L., Ascencio, M. and  
 Chavez, M. 2000. Prevalence of nutritional anaemia in  
 women of child bearing age in Costa Rica. *J. Bokin*  
*INCIENSA.* **12:** 2-3.

\*Roos, E.B., Hirvonen, T., Mikkila, V., Karvonen, S. and Rimpela,  
 M. 2001. Household educational level as a  
 determinant of consumption of raw vegetables among

male and female adolescents. *J. Preventive Med.* **33**: 282-291

Rose, D., Wood, S.D. and Baylock, J. 1995. Socio economic factors associated with the iron intake of preschoolers in the United States. *Nutr. Res.* **15**: 1297-1309

\*Rothenberg, E., Bosaeur, I. and Steen, B. 1994. Food habits, food believes and socio-economic factors in an elderly population. *Scand. J. Nutr.* **38**: 159-165

Roy, S.K. 1991. Health status of Oraon tea garden labourers. *Indian J. Social work* **11**: 372-375

Saikia, P.D. 1982. Impact of irrigation on small farmers of North-East region. *Yojana* **26**: 14-15

Sar, S.S., Thakare, G.G. and Gupta, D.N. 1991. Inadequacies in daily diet of rural people in Thane district of Maharashtra. *Indian J. Nutr. Dietet.* **28**: 334

Saradhamani, K. 1987. Labour, land and rice production - *Econ. Political Weekly* **12**: 20-23

Sathyanarayanan, K., Rao, N.B.S. and Srikantia, S.G. 1979. Nutrition and work output. *Indian J. Nutr. Dietet.* **16**: 170-173

Sausberlich, H.E., Dowdy, R.P. and Skala, S.H. 1977. *Laboratory Tests for the Assessment of Nutritional Status*. CRC press, Cleveland, Ohio, p.142

Saxena, A.X., Kulkarni, S G., Berry, S.K., Sehgal, R.C. and Beirh, O.D. 1996. Preparation, packaging and storage of



Pinni - An Indian traditional sweet. *J. Fd Sci. Technol.* **33**: 503-505

Saxena, K.J. 1986. The joint and nuclear family - A personal experience. *Indian J. Social Work* **6**: 32-36

Saxena, M. and Taneja, P. 1999. Dietary intake and energy expenditure of Bhil women of Thabua district of Madhya Pradesh. XXXII Annual Meeting of Nutrition Society of India, 25-26 November 1999. National Institution of Nutrition, Hyderabad. *Abstract*: 48.

Schofield, S.M. 1985. *Development and Problems of Village Nutrition*. Second edition. The English language book society and groom helm, London, p.143

Sen, D. 1990. Role transition of women in agriculture: Some issues (Theme paper). Workshop on women in agriculture, 29 October - November 9 1990. National Institute of Rural Development, Hyderabad. *Background papers*. p.11

Seralathan M, A., Thirumaran, A.S., and Neelakandan, S. 1993. Study of socio economic and nutritional status of farm women. Souvenir and Abstracts of IV<sup>th</sup> World Congress on Clinical Nutrition, 2-5 October 1993. Malabar Hotel, Cochin, Little Flower Medical Research Centre, Angamali. *Abstract*: 76

Seshadrinath, R. 1993. The factors influencing the intra family distribution of food among agricultural labour families of Thiruvananthapuram with special reference to nutritional status. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.112

- Sethi, B. 1982. A study of the entrepreneurship characteristics of the farmers of an agriculturally advanced district of Orissa, Ph.D. thesis, Indian Agricultural Research Institute, New Delhi, p.130
- Sharma, A.N. and Sharma, V.K. 1981. *Elements of Farm Management*. Prentice Hall of India Pvt. Ltd., New Delhi, p.40
- Sharma, S.D. and Kalia, M. 1990. Anthropometric measurements of pre-school children in Ghumarun block of Himachal Pradesh. *Indian J. Nutr. Dietet.* **27**: 47-52
- Sharon, S. and Puttaraj, S. 2000. Energy balance and nutritional status of women in an electronic industry. XXXIII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract* : 42
- Shatrugna, V.P., Sagar, V., Vasanthi, G. and Sujatha, T. 1993. Women's work and time - critical issue for women's development programme. *Proc. Nutr. Soc. India* **40**: 83-91
- Shyna, K.P. 2001. Traditional food habits of different communities in Trichur district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.128
- Shyna, P.K. 1996. Nutritional profile and mental functions of preschool children belonging to agricultural labour families in Trichur district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.114

- Sidhu, H.K. and Singh, I. 1987. A study of nutritional status of farmers in Ludhiana district. *J.Res.* **24**: 180-187
- Singh, A. and Baghe, 2001. Prevalence of nutritional anaemia in slum women. XXXIV Annual Meeting of Nutrition Society of India, 5-6 December 2001. All India Institute of Medical Sciences, New Delhi. *Abstract*: 38
- Singh, A.K., Sharma, J.S. and Singh, D.K. 1988. Participation of rural women in agriculture in the hills of Uttar Pradesh. *J. rur. Dev.* **7**: 289-297
- Singh, G. and Tripathi, H. 2001. Energy expenditure pattern of women in rural dairy enterprise. *Indian J. Dairy Sci.* **54**: 96-105
- Singh, I. and Chawla, S. 1991. Nutritional status of industrial workers. *J. Res.* **28**: 581-586
- Singh, I.J. 1998. Farm poverty, household food security and agricultural sustainability in India. *J. rur. Dev.* **17**: 619-631
- Singh, P. and Agarwal, K.N. 2001. Nutritional assessment of residents of different types of colonies in Delhi. *Indian J. Nutr. Dietet.* **38**: 223-230
- \*Singh, P., Pathak, P., Kapoor, S.K. and Kapil, U. 2001. Comparison of hemocue method with cyan methaemoglobin method for estimation of haemoglobin. XXXIV Annual Meeting of Nutrition Society of India, 5-6 December 2001. All India Institute of Medical Sciences, New Delhi. *Abstract*: 38.

- Singh, S. and Kumari, S. 2001. Nutritional status of children (6-12 years) belonging to scheduled caste a study in Samastipur district of Bihar. *Indian J. Nutr. Dietet.* **38**: 428-436
- Smitha, M.E. 1999. Food consumption pattern and nutritional status of women agricultural labourers of Ollukkara block, Trichur district, M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.126
- Sreenivasan, R., Manimegalai, G. and Padmini, T. 1991. Rural nutrition demands - a special attention. *J. rur. Dev.* **10**: 455-460
- Srijaya, M. and Rani, P.J. 2000. Energy balance in selected anaemic adolescent girls (16-18 years). XXXII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract*: 43
- \*Steyn, N.P., Burgen, S., Monyeki, K. D., Alberts, M. and Nthangeni, G. 2001. Seasonal variation in dietary intake of the adult population of Dikgale. *S. Afr. Medicinal J.* **14**: 140-145
- Sujatha, A.S. 1990. Food consumption and energy expenditure pattern of self-employed women in unorganised sector. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.124
- Sundari, T.K. 1990. Indian women having to run to stay in place? An overview of the status of Indian women. *Proc. Nutr. Soc. India* **17**: 27-29

- Swaminathan, M. 1986. *Principles of Nutrition and Dietetics*. The Bangalore printing and publishing co. Ltd., Bangalore, p.370
- Swaminathan, M.C. 1987. Non-invasive parameters for field monitoring and evaluation: their sensitivity, specificity and cost. *Nutrition Monitoring and Assessment* (eds. Gopaldas, T. and Seshadri, S.). Oxford University Press, Delhi, pp.22-25
- Swaminathan, M.C., Taskar, A.E. and Madhavan, S. 1967. Diet surveys by weighment method. *Indian J. med. Res.* **55**: 90-95
- Swaminathan, M.S. 1996. *The Increasing Role of Science and Technology in National Development in the 21<sup>st</sup> Century*. Published by the state on science, technology and environment, Kerala, p.180
- Swamy, S.N. and Vijayalakshmi, D. 1999. Nutritive knowledge and health practices among rural women. XXXII Annual Meeting of Nutrition of Society of India, 25-26 November 1999. National Institute of Nutrition, Hyderabad. *Abstract*: 36
- Swamy, S.N., Vijayalakshmi, D. and Surendra, H.S. 2000. Dietary pattern and Nutritional status of farm women labourers. XXXIII Annual Meeting of Nutrition Society of India, 1-2 December 2000. National Institute of Nutrition, Hyderabad. *Abstract*: 17
- Swietochowska, M. 1981. An assessment of the level of nutrition of the community. *Wies Wspokzesna* **25**: 91-97

- Tanden R.K. and Dhondyal, S.P. 1971. *Principles and Methods of Farm Management*. Joshi publications, Kanpur, p.120
- Tanner, S. 1987. Malnutrition and the development of households in Agreste Paraiba State of North East Braiyn. *J. Dev. Stud.* **23**: 242-246
- Thimmayamma, B.V.S. 1983. Nutrition and welfare of family. *Swasth Hind* **27**: 265-268
- Thimmayamma, B.V.S. and Rau, P. 1981. Food consumption pattern of rural families by weighment and expenditure pattern methods of diet survey. *Indian J. Nutr. Dietet.* **28**: 24-26
- Thimmayamma, B.V.S. and Rau, P. 1996. Dietary Assessment as Part of Nutritional Status. *Textbook of Human Nutrition* (eds. Bamji, M.S., Rao, N.P. and Reddy, V.). Oxford and IBH publishing Co. Pvt. Ltd., New Delhi, pp. 125-135
- Thimmayamma, B.V.S., Satyanarayanan, K., Rau, P. and Swaminathan, M.C. 1973. The effect of socioeconomic differences on dietary intake of urban population in Hyderabad. *Indian. J. Nutr. Dietet.* **10**: 8-13
- Thomas, S.P. 1989. Effect of birth order and spacing on the nutritional status of mother and child. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.131
- \*Tian, H.G., Wan, Y., Hu, G., Dong, Q.N., Yang, X.L. Pietinen, P. and Nissinen, A. 1995. Dietary survey in a Chinese population. *Eur. J. Clin. Nutr.* **49**: 26-32

- Tilve, S. 1978. Comparison of questionnaire and weighment methods of diet surveys. *Indian J. Nutr. Dietet.* **15**: 5-8
- Turshen, M. and Mebrahter, S. 1991. Women work and Nutrition in Nigeria. *Women and health in Africa*. (ed. Turshen, M.). Africa World Press, USA, pp.89-105
- Udaya, P.K. 1996. Food consumption pattern and nutritional status of farm women in Trichur district. M.Sc. (Home Science) thesis, Kerala Agricultural University, Trichur, p.99
- Ukkru, M.P. 2001. Comparative analysis of working condition, work pattern and food consumption trends in women engaged in different occupations. XXXIV Annual Meeting of Nutrition Society of India, 5-6 December 2001. All India Institute of Medical Sciences, New Delhi. *Abstract*: 43
- Umarani, K. 1999. Participation of women in agriculture and allied activities. *J. Ext. Education* 2466-2470
- UNICEF. 1985. The state of world's women. *Swasth Hind* **24**: 293-294
- Uno, T., Kohaya, J., Murozumi, K., Fajitha, K., Mizuno, M. and Kanar, M. 1991. Some papers on food and agricultural problem of Japan and other Asian countries. *Research paper on food and agricultural problem*, National Research Institute of Agricultural Economics, Japan, **10**: 71

- Usha, V., Thomas, S.P. and Prema, L. 1990. The nutritional status of farm women of instructional farm. Workshop on women in agriculture, 29 October-November 9, 1990. National Institute of Rural Development, Hyderabad, *Background papers*. p.35
- Varma, P. 1996. A multidimensional analysis of self employed among farm women. M.Sc. (Ag.) thesis, Kerala Agricultural University, Trichur, p.112
- Vasanthakumari, P. 1999. Problems of agricultural labour. *Rur. India* **62**: 243-244
- \*Vasconcellos, M.T.L. and Portela, M.C. 2001. Body mass index and its relationship to nutritional and socio economic variables: a linear regression approach to a Brazilian adult sub population. *Cadernos de Saude Publ.* **17**: 1425-1436
- Venkitalakshmi, P. and Peramma, D. 2000. Body weight and physical work capacity. *Indian J. Nutr. Dietet.* **37**: 255-258
- Vijayalakshmi, P. 1991. Impact of income generation by women on family nutritional improvement. *Proc. Nutr. Soc. India* **38**: 381-393
- Vijayalakshmi, P., Kupputhai, U. and Umamaheswari, V. 1987. Anaemia and work output of farm women. *Indian J. Nutr. Dietet.* **12**: 9-12
- Vijayaraghavan, K. 1987. Anthropometry for assessment of nutritional status. *Indian J. Paediatrics* **54**: 511-520



- \*Weiget, M., Armijos, R.M. and Monaco, M.H. 1992. Nutritional and health status of rural women colonies in the subtropical lowlands of North Ecuador. *Ecol. Fd Nutr.* **29**: 25-43
- \*Weisell, R.C. and Francois, P.S. 1982. Reference weight for height standards – An easier approach for computerization. *Fd Nutr.* **8**: 12-18
- \*Wood, S.D. and Baylock, T. 1982. Impact of household size and income and food spending patterns. *Wld Agric. Econ. rur. Sociol. Abstr.* **24**: 2364-2367
- World Health Organisation. 1993. World Health. *WHO Magazine* **3**: 298-301
- Yegammai, C. and Ambili, G.V. 1992. Nutritional profile of the selected fisher folk families in Thirukunnappuzha village of Alleppy district. *Indian J. Nutr. Dietet.* **29**: 186-192
- \*Yongok, K. 2001. Food and nutrient consumption patterns of Korean adults by socio economic status. *Korean J. Community Nutr.* **6**: 645-656
- \*Yuliati, K. and Widowati, T. 1998. Food consumption pattern and nutritional status of community living at non tidal swamps - a case study in South Sumatra. Afro-Asian regional conference on irrigation and drainage, 19-26 July 1998. Denpasar, Indonesia. *Abstract*: 8

\* Originals not seen

# Appendices

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15. Other sources of income of family

- a) Agriculture :
- b) Business :
- c) Poultry :
- d) Dairy :
- e) Others - specify :

16. Total income of family : Rs. \_\_\_\_\_ per month

17. (a) Do you own land : Yes/ No

If yes,

Total area	Area under cultivation	Specify how you got this land			
		Purchased	Inherited	Government	Others

(b) Details regarding the cultivation of crops

Sl. No.	Name of the crop	Area cultivated	Total produce per year	Quantity used at home	Quantity sold	Income

18. (a) Do you have any domestic animals? Yes/ No

If yes,

(b) details

Animal	Number	Quantity produced per month	Specify how you got this				Income from produce	Own consumption
			Gift	Purchased	Govt	Others		

19. (i) What will you do the cow dung?

a) Own use

b) Sale

(ii) If you are selling the cow dung specify the cost/kg

20. Do you have any kitchen garden? Yes/ No

If yes specify

Items of cultivation	Use of produce		Sale
	By family	Gift	

21. Have you taken any loan? Yes/ No

If yes, give details

Sl. No.	Source of debt	Amount of debt (Rs.)	Purpose	Long term	Short term	Mode of payment	Interest rate

22. a) Monthly expenditure pattern

Sl. No.	Items	Amount spent per month	Percentage of total income
1	Food		
2	Clothing		
3	Shelter		
4	Transport		
5	Recreation		
6	Education		
7	Electricity		
8	Health		
9	Fuel		
10	Luxuary and personal		
11	Remittance		
12	Savings		

b) If you have savings give details

Sl. No.	Mode of saving				Frequency of saving	Purpose of saving	Amount saved (Rs.)
	Post office	Bank	Chitty	Others (specify)			

23 (a) Housing conditions

- i) Type of house : own/ rented  
 ii) No. of rooms : 1/2/3/4/5/more  
 iii) Walls : Brick/ Mud/ Thatched  
 iv) Roof : Thatched/ Tiled/ Terraced

(b) Other characteristics

- i) Separate kitchen : Yes/ No  
 ii) Source of drinking water : own well/ public tap/ public well/ tank/ river/ near by home/ others  
 iii) Lavatory facilities : Own latrine/ public latrine/ open field  
 iv) Drainage facilities : Open drains/ closed drains/ nothing  
 v) Electricity facilities : Yes/ No  
 vi) Recreational facilities : Yes/ No  
 If yes, specify : radio/ transistor/ television/ VCR/ others  
 vii) Transport facilities : bus/ van/ bicycle/ motorbike/ jeep/ auto

24. Details regarding using fuel

- i) Type of fuel used at home  
 Wood/ agricultural waste/ cowdung/ sawdust/ kerosene/ electricity/ LPG/ others  
 ii) Source of fuel  
 Purchased/ collected from surroundings

25. When anybody is ill do you make use of the facilities of health centre : Yes/ No

If yes specify

26. a) Epidemics prevalent in the locality in the past one year

i) Measles iv) Whooping cough

ii) Chicken pox v) Mumps

iii) Typhoid vi) Others (specify)

b) Was any member of the family affected by the above diseases Yes/ No,

If yes specify

i) Name of the disease :

ii) Name of the individual :

27. Do you have any health facilities in your locality : Yes/ No

If yes specify

PHC/ private hospital/ dist. hospital/ medical college hospital/  
private doctor/ ayurvedic doctor/ homoeopathic doctor

28. Social participation

a) Are you a member of any social organizations : Yes/ No

If Yes specify

i) Mahila samajam iv) Ayalkootam

ii) Youth club v) Grama Sabha

iii) Others (specify)

29. Do you attend the meeting organised by these organisation :  
Yes/No

If yes, how frequently do you attend

sometimes/ always/ never

30. Details of working pattern of the respondent

a) How many days you get work in a week?

b) Will it vary during different seasons : Yes/No

c) Do you have any off day in a week?: Yes/ No

d) How frequently you go for work

daily/weekly once/ weekly thrice/ occasionally

e) At what time do you go for work?



- f) How many hours you get interval?  
morning/ lunch/ evening
- g) At what time you return from work?
- h) If you are not going for work daily give the reasons
- i) No work in the field
  - ii) Work is seasonal
  - iii) Health problems
  - iv) Nobody to look after children
  - v) Low wage
  - vi) Tedious
  - vii) Others (please specify)
- m) Do you go for any other work during off days : Yes/ No  
If yes, give details

Details of work	Days	Wage

- n) Do you face any discrimination in the type of work allotted for men/ women : Yes/ No  
If yes, give details of work/ operations in which discrimination is noted
- 1
  - 2
  - 3
  - 4
- o) Do you face any discrimination in the wage given to male/ female labourers for various agricultural operations: Yes/ No  
If yes, give details

Agricultural operations	Wage for men	Wage for women

p) Do you like your working environment : Yes/ No

If no, give reasons

i)

ii)

iii)

iv)

q) Do you get work daily during summer and rainy seasons : Yes/No

If yes, give details

Season	No. of days/ week	Wage/ day

r) Do you face any problems in your working environment? : Yes/ No

If yes, please specify the problems

s) Do you use any implements for doing agricultural work : Yes/ No

If yes, give details

Name of the implement	Work for which it is used	Own implement	Supplied by land owner	Rent

t) Do you have any problems due to the agricultural work done by you : Yes/ No

If yes, give details

Details of problems

i) Health

ii) Personal

iii) Work is very tedious

iv) Wage

v) Time allocation

vi) Problems experienced due to introduction of other specific implements

u) Do you work only under one farmer? Yes/ No

If no, give details

v) Do you get any help from your co workers? Yes/ No

w) Details of participation of men/ women for various field operations in rice cultivation

Activities	Men	Women
Ploughing		
Levelling		
Fertilizer application		
Transplanting		
Irrigation		
Weeding		
Harvesting		
Threshing		
Winnowing		
Storing of grains		
Storing of rice straw		
Pesticide application		
Total		

x) Participation of household activities by men/ women

Activities	Men	Women
Cleaning the house		
Fetching water		
Cooking		
Cleaning utensils		
Washing clothes		
Child care		
Grinding grains/ coconut etc.		
Purchase of household articles		
Others/ specify		

## APPENDIX II

Interview schedule to collect information on food consumption pattern of selected families

1. Name of the respondent :
2. Place of survey :
3. Block :
4. Panchayath :
5. Food habit : Vegetarian/ Non-vegetarian
6. Staple food :
7. Details of food expenditure

Sl. No.	Food items	Total cost spend per month	% of total income
1.	Cereals		
2.	Pulses		
3.	Green leafy vegetables		
4.	Other vegetables		
5.	Roots & tubers		
6.	Fruits		
7.	Oils & fats		
8.	Spices & condiments		
9.	Nuts & Oil Seeds		
10.	Sugar		
11.	Milk & Milk Products		
12.	Meat		
13.	Fish		
14.	Egg		
15.	Others (specify)		

8. Details of frequency of using various food items

Sl. No.	Food items	Frequency of use				Monthly once	Occasionally	Never
		Daily	Weekly					
			4	3	2			
1.	Cereals							
2.	Pulses							
3.	Green leafy vegetables							
4.	Other vegetables							
5.	Roots & tubers							
6.	Fruits							
7.	Oils & fats							
8.	Spices & condiments							
9.	Nuts & Oil Seeds							
10.	Sugar							
11.	Milk & Milk Products							
12.	Meat							
13.	Fish							
14.	Egg							
15.	Others							

9. a) Meal pattern of the family:

1. One major meal :
2. Two major meals :
3. Three major meals :

10. Daily meal pattern

Sl. No.	Meal time	Menu of 1 <sup>st</sup> day	Menu of 2 <sup>nd</sup> day	Menu of 3 <sup>rd</sup> day
1.	Early morning			
2.	Breakfast			
3.	Lunch			
4.	Evening tea			
5.	Dinner			
6.	Others (specify)			

11. Do you maintain accounts for food expenditure? :

Yes/ No

If yes, in i) what form: written/ memory

ii) Daily/ weekly/ monthly

12. Do you plan your meals in advance? : Yes/ No

If yes, what is the basis of planning?

a) Total family requirement :

b) Food stuffs available :

c) Money available :

d) Likes & dislikes of family :

13. Do you give equal importance to all family members in food distribution? : Yes/ No

If yes, what is the order of importance?

Order	Reasons
1.	
2.	
3.	

14. Details of consumption of raw food items

i) Do you consume any raw food items? Yes/ No

If yes, specify the food stuffs.

ii) Do you find any advantage or disadvantage of eating raw food? Yes/ No

15. Do you use left over food items? Yes/ No

If yes, specify the items? How it is used?

16. Do you use boiled water for drinking? Yes/ No

17. Do you use specific time schedule for taking food? Yes/ No

If yes, specify the reasons

18. How many times do you cook meals in a day?

Once/ twice/ thrice/ more than thrice

19. What are the types of cooking vessels used?

Steel/ aluminium/ earthen pot/ combinations of all/ others (specify)

20. What are the cooking devices used?

Smokeless chulah/ ordinary chulah/ gas stove/ kerosene stove/ heater

21. What are the labour saving devices used in the house?

- a) Pressure cooker
- b) Mixer
- c) Coconut scraper
- d) Grinder
- e) Motor pump

If others, specify



22. Cooking methods followed for various food items

Sl. No.	Food items	Boiling	Straining	Absorption	Steaming	Soaking	Deep fat	Shallow fat	Others
1.	Cereals								
2.	Pulses								
3.	Vegetables								
4.	Roots & tubers								
5.	Fruits								
6.	Meat								
7.	Fish								
8.	Egg								
9.	Milk								

23. Details of food preservation :

i) Do you preserve any food items in your home? Yes/ No

If yes, specify

Sl. No.	Food items	Methods used	Problems encountered
1.	Cereals		
2.	Pulses		
3.	Fruits		
4.	Milk		
5.	Meat		
6.	Fish		
7.	Others		

ii) Do you buy any preserved food item from outside? Yes/No

If yes, specify

24. Details of storage of food items:

Do you store any food item in your home? Yes/ No

If yes, specify

Sl. No.	Food items	Methods of storage	Period of storage	Problems encountered
1.	Cereals			
2.	Pulses			
3.	Vegetables			
4.	Fruits			
5.	Meat			
6.	Fish			
7.	Egg			
8.	Others			

25. Do you employ any specific treatment before storing food items? : Yes/ No

If yes, specify

26. Food during special conditions

Sl. No.	Condition	Foods given	Foods avoided	Reasons
1.	Infants			
2.	Children			
3.	Pregnancy			
4.	Lactation			
5.	Old age			

27. Diet during special occasions

Sl. No.	Occasion	Foods prepared	Reasons
1.	Birthday		
2.	Death		
3.	Marriage		
4.	Others		

28. Diet during diseases

Sl. No.	Disease	Foods given	Reasons	Foods avoided	Reasons
1.	Fever				
2.	Diarrhoea				
3.	Measles				
4.	Chicken pox				
5.	Whooping cough				
6.	Hypertension				
7.	Diabetes				
8.	Others				

29. Do you/ your family keep any particular believes listed below in connection with intake of foods?

- a) Pregnant women are not supposed to eat papaya fruit and pineapple : Yes/ No
- b) Curd and banana are not supposed to be taken during fevers : Yes/ No
- c) Meat & curd are not supposed to be eaten together : Yes/ No
- d) Women are not supposed to eat twin banana : Yes/ No
- e) Don't eat horsegram and curd together : Yes/ No
- f) Don't eat drumstick leaves during "Karkidaka" month : Yes/ No
- g) Not to drink milk after taking citrus fruits : Yes/ No
- h) Protein rich foods should be avoided during fever : Yes/ No
- i) During the period of 'Grahamam' do not consume any food : Yes/ No
- j) Not to drink tender coconut water during night : Yes/ No
- k) Chicken & fish should not be taken together : Yes/ No
- l) Rice should be avoided during fasting : Yes/ No
- m) Any other, specify : Yes/ No

## APPENDIX III

### 1. Schedule for clinical assessment

1. Sex
2. Age
3. Height
4. Weight
5. General appearance
  0. Good
  1. Fair
  2. Poor
  3. Very poor
6. Hair
  0. Lack of lustre
  1. Thin and sparse
  2. Straight
  3. Dyspigmentation
  4. Flag sign
  5. Easy pluckability
7. Face
  0. Diffuse depigmentation
  1. Naso-labial dyssebacea
  2. Moon face
8. Eyes
  0. Pale conjunctiva
  1. Bitot's spot
  2. Conjunctival xerosis
  3. Corneal xerosis
  4. Keratomalacia
  5. Angular palpebritis

## 9. Lips

- 0. Angular stomatitis
- 1. Angular scars
- 2. Cheilosis

## 10. Tongue

- 0. Oedema
- 1. Scarlet and raw tongue
- 2. Magenta tongue
- 3. Atrophic papillae

## 11. Teeth

## 12. Gums

- 0. Spongy, bleeding gums

## 13. Glands

- 0. Thyroid enlargement
- 1. Parotid enlargement

## 14. Skin

- 0. Xerosis
- 1. Follicular hyperkeratosis – types 1 and 2
- 2. Petechiae
- 3. Pellagrous dermatosis
- 4. Flaky-paint dermatosis
- 5. Scrotal and vulval dermatosis

## 15. Nail

- 0. Koilonychia

## 16. Subcutaneous tissue

- 0. Oedema

## 17. Muscular and skeletal systems

- 0. Muscle wasting
- 1. Craniotabes
- 2. Frontal and parietal bossing
- 3. Epiphyseal enlargement (tender or painless)

4. Beading of ribs
  5. Persistently open anterior fontanelle
  6. Knock-knees or bow-legs
  7. Diffuse or local skeletal deformities
  8. Deformities of thorax (selected)
  9. Musculo-skeletal haemorrhages
18. Internal systems:
- a) Gastro-intestinal
    0. Hepatomegaly
  - b) Nervous
    0. Psychomotor change
    1. Mental confusion
    2. Sensory loss
    3. Motor weakness
    4. Loss of position sense
    5. Loss of vibratory sense
    6. Loss of ankle and knee jerks
    7. Calf tenderness
  - c) Cardiovascular
    0. Cardiac enlargement
    1. Tachycardia

## APPENDIX IV

Schedule for individual food weight survey (one day weight method)

1. Name of the respondent :
2. Age of the respondent :
3. Place of survey :
4. Details of food consumption

Name of the meal	Menu	Food consumption		
		Weight of raw ingredients used by the family (g)	Weight of total cooked food used by the family (g)	Weight of total cooked food consumed by the individual (g)
Breakfast				
Lunch				
Evening tea				
Dinner				
Others				

## APPENDIX V

The formula for the calculation of food frequency scores as suggested by Reaburn *et al.* (1979).

$$\text{Percentage of total score} = \frac{R_1S_1 + R_2S_2 + \dots + R_nS_n}{n}$$

$S_n$  = Scale of rating

$R_n$  = Percentage of respondents selecting a rating

$n$  = Maximum scale of rating



# **NUTRITIONAL PROFILE OF WOMEN LABOUR IN RICE CULTIVATION**

By

**JYOTHI. R**  
(2000-16-03)

## **ABSTRACT OF THE THESIS**

*Submitted in partial fulfilment of the  
requirement for the degree of*

*Master of Science in Home Science*

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## ABSTRACT

A study on the food consumption pattern and nutritional status of 120 agricultural women labourers was carried out in Palakkad district during 2002.

The results of the study indicated that majority of the families were of nuclear type and followed patriarchal family system. Majority of them were Hindus and belonged to scheduled caste. The family size ranged in between four to six.

Majority of the adults were literate and engaged as agricultural labourers. Upto 10 cents of land was owned by majority of respondents. Only very few families cultivated crops and had domestic animals.

Majority of the families had a monthly income in between Rs. 500-2500.

Very few families took loan from bank and co-operative society.

Maximum proportion of income was spent on food items specially cereals and nobody had the habit of saving money.

All the families owned a house and most of them were brick made and tiled. The houses were occupied with separate kitchen with two to three rooms. Drinking water, electricity and recreational facilities were satisfactory where as proper lavatory and drainage facilities were not present in the houses.

Most of the families used firewood as fuel and some of them used sawdust and kerosene along with wood.

As a medical aid majority of the families depended on primary health centre (PHC), private hospital as well as district hospital for their medical care.

Very few respondents were members of social organisations.

All the families surveyed were non vegetarians and consumed rice as the staple food. Maximum of the food expenditure was for cereals compared to other food items. Most frequently used foods were cereals, fats and oils, spices and condiments and sugar and jaggery.

Majority of the families did not plan their meals in advance and consumed food three times a day and gave equal importance to all family members in food distribution.

Consumption of raw vegetables was meagre. Majority of the families reused the left over foods. Practice of drinking water without boiling was more common.

Special foods are given only during infancy. Diet modification during disease conditions was observed.

The nutritional profile of the respondents indicated that the body weight varied from 30 kg to 65 kg with a mean weight of 43.1 kg. Majority (86.67 %) of the respondents had lower body weight than the reference body weight. Height of 67.5

per cent of the respondents varied from 140.1 cm to 150 cm. About 40 per cent of the respondents had various grades of CED.

Actual food and nutrient intake revealed deficient intake of all food groups except other vegetables. The intake of all nutrients was lower than the RDA.

Clinical examination showed various symptoms of nutritional deficiencies among the respondents.

Biochemical estimation of blood showed low haemoglobin values among the respondents indicating anaemia.

Majority of the respondents used to work for 7 ½ hours in a day for a wage varying from Rs. 40 to 50.

All the labourers showed negative energy balance when the daily energy intake was compared with daily energy expenditure.

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