

**EXTENT OF HOUSEHOLD FOOD SECURITY OF SELECTED
FAMILIES OF LANDLESS AGRICULTURAL LABOURERS OF
KALLIYOOR PANCHAYAT-A CASE STUDY**

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CERTIFICATE

Certified that this thesis entitled “**Extent of household food security of selected families of landless agricultural labourers of Kalliyoor panchayat-a case study**” is a record of research work done independently by Ms. Archana Vijayan (2001-16-04) under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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DECLARATION

I hereby declare that this thesis entitled “**Extent of household food security of selected families of landless agricultural labourers of Kalliyoor panchayat-a case study**” 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, associateship, fellowship or other similar title, of any other university or society.

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DEDICATED TO

**ACHAN, AMMA,
JYOTHI CHETTAN,
ADARSH CHETTAN**

&

MURALI MAMMAN

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Introduction

1. INTRODUCTION

Food is the basic need of a person and access to food has been recognized as the basic human right. The ability of a person to eat enough, stay active and lead a healthy life comes under the preview of the-term food security. World Bank (1986) has defined food security as access by all people at all times to enough food for an active healthy life. The essential elements of most of the definitions of food security are 'demand' (access) and 'supply' (availability) of food.

MSSRF (2001) has added another dimension to food security. According to them food availability, access and absorption are the three forces that would ensure food and nutrition security.

Food security of a population, in general has been considered at different levels, *viz.*, global, regional, national, state, household and individual. With somewhat satisfactory levels of national food security, which was the outcome of production performance of Indian agriculture during the past decade, attention has been shifted from national food security concerns to individual and household food security.

Household food security in broader terms as explained by Varma (2001) means that the household has access to sufficient food both in quantity and quality to meet the nutritional requirements of all its members. The term food security includes the ready availability of nutritionally adequate and safe food and an assured ability to acquire adequate food in a socially acceptable way (*ie.*, without resorting to emergency food supplies, scavenging, stealing or other coping strategies).

The concept of food security has been undergoing an evolutionary change during the past fifty years. In the 1950's food security was considered essentially in terms of production and it was assumed that adequate production will ensure availability of food in the market as well as in the household. However, later it was proven that availability alone will not lead

to food security and that physical availability alone will not ensure economic access which is also needed to procure essential food items.

Several measures have been suggested to enhance food security. It has been mentioned that increased employment opportunities will make substantial contribution towards expanding the economic access to food. .

According to Singh (2002), two conditions are to be satisfied to ensure food security, viz., increased agricultural production (and availability of food grains for the poorer sections at prices below the one's prevailing in the market), and strengthening scope for employment. Satisfactory production levels and stability of supplies should be matched by a reduction in poverty and an increase in the effective demand to ensure economic and physical access of food among the poor. Further, there is some evidence that regions with higher initial levels of female labour force participation mainly in agriculture, have experienced larger growth of per capita expenditure on food and also faster poverty decline (Dreze and Srinivasan, 1996). It has been further pointed out that if physical and economic access to food is assured, ecological factors will determine the long-term sustainability of 'food security'.

It is important to realise that food security at the levels outside the household has a strong bearing on the performance at the household level. In the light of the complexities related to the causes and effects of household level food security the concept of food security or insecurity has to be more critically understood and applied albeit within the limits of the accepted definitions.

In India while the household food security is influenced by both physical access and economic access, food security of individual members of the household is found to be affected by several factors including intra household allocation of food or inherent gender bias. Moreover, as nutritional requirements of different households generally vary to a large extent depending on the family composition, the consequences of food insecurity affects primarily the nutritional status /

health and well being of men engaged in heavy physical activity as well as the vulnerable sections of the populations *viz.*, the women and children, though the ultimate concern with respect to food security may be that of household and individual levels.

However it has been categorically announced that labour households account for a large proportion of the food insecure population. Most of the agricultural labourers are the victims of food insecurity, though they are the real producers of foods but are not the owners of land and as such they are also not the owners of the produce grown on that land (Swaminathan, 2001). It is estimated that over 45 to 50 per cent of the rural families in India are presently living in poverty and are threatened by food insecurity, which includes the land less agricultural labourers to a large extent.

Hence it is appropriate to study the household level of food security among agricultural labourers, who form 25 per cent of the main working population of Kerala (Government of Kerala, 2001). These agricultural labourers especially the landless, shoulder the multiple burden of under employment, poverty and under nutrition though they are the producers of food. With changes in land availability, shift in cropping pattern, alteration in employment opportunities, indebtedness, removal of subsidies, fluctuation in general price levels, modifications in the PDS norms and supplementary feeding programme the household food security of the agricultural labourers of Kerala is at cross roads.

In this context, a case study is undertaken to assess the extent of household food security enjoyed by selected families of land less agricultural labour families of Kalliyoor panchayat, a rural area of Thiruvananthapuram.

This study if done on a large scale would help to draw strategies that would enhance the quality of life of this weaker section who form the backbone of the agricultural economy of the state, as the concept of household food security is said to be a fundamental analytical tool and organising principle of designing poverty alleviation projects and programmes as stated by IFAD (1999).

Review of Literature

2. REVIEW OF LITERATURE

The review of literature pertaining to a case study related to food security of landless agricultural labourers” is presented under the following subheadings.

- 2.1 Definitions of food security
- 2.2 Types of food insecurity
- 2.3 Factors affecting food security
- 2.4 Methods to assess food security
- 2.5 Food security among labourer population and prevalence of food insecurity

2.1 DEFINITIONS OF FOOD SECURITY

Sarkar (2000) has defined food security as “access by all people at all times to the food needed for a healthy life”. While World Bank (1986) defines food security as “access by all people at all times to enough food for an active healthy life. The essential elements of this definition are demand (access) and supply (availability) of food.

Household food security in broader terms as explained by Varma (2001) means that the household has access to sufficient food both in quantity and quality to meet the nutritional requirements of all its members. According to FAO/WHO (1992) a household is said to be food secure when it has access to food needed for a healthy life for all its members and when it is not at undue risk of losing such access. IFAD (1999) describes household food security as “the capacity of households to procure a stable and sustainable basket of adequate food”. In operational terms, this implies (a) measures to enhance and stabilize household access to and availability of food across seasons and

transitory shortages (b) activities that would sustain food supply in the long run and (c) constant attention to the adequacy of food while complying with nutrient and safety requirements and cultural preferences.

2.2 TYPES OF FOOD INSECURITY

According to MSSRF (2001) there are four types of food insecurity. They are present food insecurity, potential food insecurity, chronic food insecurity and transitory food insecurity. Potential food insecurity is the condition in which a state producing sufficient food at present may not be able to produce the same amount in future, due to environmental factors such as land degradation or ground water depletion or due to economic factors. Potential food insecurity is related not only to existing malnutrition of the people in a region but also to the lack of access to safe drinking water and poor sanitation and health conditions. The likelihood of a person falling ill or consuming a diet, which is unbalanced constitutes potential food insecurity. Chronic food insecurity refers to a situation in which people consistently consume diets inadequate in calories and essential nutrients. This often happens due to inability to “access food by production, purchase, gift or aid. Transitory food insecurity is a temporary short fall in food availability and consumption. Factors like fall in income, increase in food prices, shortage of production, temporary shortfall due to floods, droughts and other natural calamities etc. lead to temporary food insecurity (MSSRF, 2001).

The World Bank (1990) reports two types of food insecurity namely chronic food insecurity and transitory food insecurity. According to them “chronic food insecurity” is a persistently inadequate diet caused by the continual inability of households to acquire needed food either through market purchases or through production. Chronic food insecurity is rooted in poverty while transitory food insecurity is a temporary decline in a household’s access to needed food, due to factors such as instability in

food prices, fall in income, shortage of production, temporary short fall due to floods, droughts and other natural calamities etc.

UNACC / SCN (1991) has stated that it is typically the chronically food insecure who are hit hardest by transitory food insecurity problems.

A part from the above classification the food security concept has been considered at three levels. They are macro, meso and micro as observed by George (1999). According to the author the macro level refers to global, national and regional concerns, the meso level applies to district, city and village and micro level is the one which encompasses families, households and individuals.

While the ultimate concern may be at the household and individual levels, often there is a great disparity in food security among regions, nations, households and individuals (Jean *et al.*, 1996). The International Fund for Agricultural Development (IFAD, 1999) has stressed that household food security is the prime concern of all households which determines their production and investment choices. Increased food availability at the national level is not sufficient to achieve household and individual food security. Physical access should be accompanied by economic access which determines people's ability to acquire food as reiterated by World Bank (1990).

2.3 FACTORS AFFECTING FOOD SECURITY

Several causes of food insecurity have been reported by various workers.

Barah *et al.* (1994) are of the opinion that food security is a complex issue having several dimensions gender discrimination, starvation, poor food and nutritional practices, human growth, political elements, wars, natural calamities, due to which rural people cannot afford sufficient food to consume a balanced diet.

2.3.1 Poverty

Poverty has been recognized globally both as a cause and consequence of food insecurity and ill health (Selvaraj and Jayaprakashan, 2001). According to Aujla *et al.* (1990) poverty is a major determinant of chronic household food insecurity. The poor do not have adequate means or entitlements to secure their access to food, even when food is available in local or regional market. NIRD (1999) has reported that the larger the number of poor, lower would be their access to food and higher would be their food insecurity and vulnerability. MSSRF (2001) through their study on food security in seven states of India (Bihar, Madhya Pradesh, Rajasthan, Orissa, Utter Pradesh, Jharkhand and Chattisgarh) found that poverty is one important cause of persistent food insecurity.

2.3.2 Discrimination by gender

There is a considerable gender difference in food distribution with in the household which has led to food insecurity among women. According to Chandhri and Wilson (2000), factors that determine food access by women in a household are economic, social and cultural factors.

Basu *et al.* (1993) had reported that the bias against female is the result of the intangible variables of culture and custom. Such cultural practices may have had their origins in economic factors as men being the livelihood earners should be fed first. It has resulted in the preference of male members in food and healthcare allocation with in the household. Joshi and Varsha (2000) are of the opinion that women in a patriarchal society like India, gives priority to her family members than herself. They have further explained that a women subordinates her needs to the requirements of the family; her family's social class, her economic position, her life course and her socialization conditions her attitudes and behaviour.

However Haddad (1993) had revealed that the presence of working women might well increase the food consumption of poorer households, even if the women have to travel away from home to earn money. This effect may be due to a variety of reasons such as improved capacity of the wife to exert her preferences within the household and her improved ability to buy food items that require cash in small but reliable flows.

MSSRF (2000) through their study conducted in Orissa and Madhya Pradesh found that gender discrimination with respect to food distribution is prevalent generally with in the households that they had surveyed.

Food security is further compounded by regional disparities and most importantly individual, family or intrahousehold food distribution with in the households, women face the brunt of chronic malnutrition as they are affected by age old gender discrimination (Manonmani, 2001).

Lerinson and Morianda (1990) are of the view that gender is the most significant determinant of nutritional status. According to the lower nutritional status among females was partially due to their inadequate dietary intake and the intake of inferior quality foods.

Senauer (1990) reviewed the factors concerning household behaviour on food consumption and nutrition and found that income, price changes, agricultural commercialization, household economics and education determined the intra household allocation of food and there by the nutritional status of the population.

2.3.3 Intra household food distribution

Chem and Souza (1991) revealed that in India, males usually got served first followed either by women or more likely by children. Devadas and Easwaran (1990) in their studies had found that even though the female head of the family cooked and distributed the food, greater priority was given to the male head and pre-school children in allocating the food. In a survey conducted by Harris (1986) it was

suggested that men took unfairly large shares and this was the cause of high prevalence of malnutrition among females and children.

Behrman (1990) had detected some evidence of systemic gender differences in intrahousehold nutrient allocation in southern and western Asia. He also found that greater share of food went to adult members of the household, particularly males who received preferential treatment over young children in terms of food distribution.

Chaudhary *et al.* (1991) had studied the dietary adequacy and sex bias, and opined that “son preference” hypothesis in intrafamily distribution that made differential nutrient intake by boys and girls. He had further stated that strong preference for boys was shown with regard to expenditure on health and childcare.

Abdulla (1990) had examined seasonal variability in the intrahousehold food distribution and found that in hungry season the share of allocation of food to young girls was lower than that during the post harvest seasons, while Devadas *et al.* (1990) in their studies done in Tamil Nadu had found definite preference for boys with regard to access to milk, eggs, butter etc from the family diet, though there was no such difference between the children of the two sexes with regard to cereals and vegetables. Deodalkar (1990) in his studies from rural South India had also found seasonal differences in intrahousehold nutrient supply among children.

Srinivasan *et al.* (1991) conducted a study in Tamil Nadu covering 2100 rural households in an attempt to analyse food consumption pattern as influenced by socio-economic factors. They had found that in the low-income groups the diet mainly consisted of cereals (495 to 564 g / day) and some vegetables (84 to 124 g / day). The diets of higher income groups were composed of less cereal, more vegetables, pulses, milk products, fats and oils. Fruits were neglected by all the categories.

Seshadri (1993) conducted a study on intrafamily distribution of food among one hundred agricultural labour families having both male and female children of adolescent age group and found that 30 per cent

of the families gave preference to the male members of the family in serving food. In 21.00 per cent of the families, foods were served first to the male members and children. In 15.00 per cent of the household surveyed, family members took their meal according to their convenience where as in 10.00 per cent of the families, all members had their meal together. While five per cent gave preference for children and two per cent gave preference to old persons while serving foods. Three per cent of the families gave preference to employed members. None of the families showed preference to girls or women in serving meals.

In his study Schofield (1990) had found that intrafamily distribution of food and nutrients tend to favour the household men. It was also revealed through the survey that senior male members of the household were frequently given the best diet in terms of both quality and quantity and that boys often had priority over girls.

Asha (1994) reported that in India intrahousehold disparity in food distribution among children and women is one causes of low intake of food among this category.

2.3.4 Income

Von Braun (1991) and Dewalt *et al.* (1990) reported that households real income is central to household food security as income limits the amount of food which can be obtained.

Maya and Rao (1991) had reported that income showed a direct relationship with nutritional status and morbidity among population groups.

John and Kennedy (1990) found that control of income within the household has implications whether the income is spent on food. Households in which women have a greater degree of control over the use of income appear to produce better nutritional outcomes at given income level. This is often due to an apparently higher preference for spending on food as opposed to other goods on the part of women as compared to men.

Lorch (1991) reported that the nutritional and welfare effect of improving households income is greater if the income falls under female control.

Brown (1991) Anderson (1988) and Gracia (1987) found that income has a binding constraint on house hold food availability and hence other interventions are likely to be ineffective. Mahandra and Dev (1997) have further ascertained that as household's income is determined by the productive resources it commands, which may include land, but always includes labour. Raising the productivity of household members and increasing employment opportunities are direct means of raising household income and therefore household food availability.

Hamilton *et al.* (1990) and Tripp (1981) found that the cash income which is received in small regular payments is more likely to be spend on food than seasonal income even if the annual amount is the same.

According to Vijayaraghavan *et al.* (1998) the factors which contribute to wide variation in household food security in backward areas of Orissa were found to be low per capita income, non-ownership of agricultural land and lower agricultural production.

Dandekar and Rath (1993) found that the number of people suffering from under nutrition in India vary between 40 per cent and 60 per cent. This is because the people do not have sufficient income for getting a minimum level of required nutrition.

Shah *et al.* (1990) revealed that income levels, play a role in determining the levels of intake of nutrients. Davis (1990) stated that income of the households is a major factor determining food expenditure. To the extent that food assistance programmes such as food stamp programme enhance the income position of low income households, food expenditure outlays are increased.

2.3.5 Morbidity

Blanken *et al.* (1991) found that poor health and sanitation were the key factors for explaining childhood malnutrition and morbidity.

Abdussalam and Grossklaus (1991) reported that illness is an important factor in determining nutritional status.

According to WHO (1991) if environmental sanitation and availability of health services are poor it will affect the nutritional status, leading to high morbidity.

NNB (1995) had reported that in India owing to persistent food insecurity, nearly 43.8 per cent children suffer from moderate degrees of protein energy malnutrition and another 8.7 per cent from extreme degrees of PEM.

According to Venketeswara Rao (1991) the poor health condition has led to poverty. He has further explained that people living in the rural areas and urban areas were not able to lead a life worthy of human beings due to poverty. This poor health condition was the result of the pernicious combinations of several socio-economic factors like unemployment, lack of material advancement, poor housing, poor sanitation, malnutrition, social apathy, absence of will power and initiative to change for the better etc.

2.3.6 Caste and religion

Certain sections of the population are deprived of food access and livelihood access due to their disadvantages position as scheduled castes and scheduled tribes. NSSO (1994) through their sample survey conducted in Gujarat, Andhra Pradesh and Madhya Pradesh on scheduled tribes found that the consumption level of tribal population was very low and was below the recommended level of intake. Even staple foods such as cereals were not consumed in adequate quantities.

Ramanujan (2000) had reported that most of the scheduled tribe population are poor and are living on subsistence nutrition. He further

observed that extreme poverty and food insecurity is common among them, whether they belong to the occupational groups of cultivators or labour households and that the cultivators belonging to scheduled tribes are poorer than those dependent on agricultural and non-agricultural labour.

Seshadri (1997) is of the opinion that, forests provide the scheduled tribes livelihood and food for most of the year. The decline in non-timber forest produce which was traditionally traded by scheduled tribes living in forest areas is another cause of poverty and lack of access to food. MSSRF (2000) after conducting a survey among the scheduled tribe populations particularly in the states of Orissa and Madhya Pradesh found that the scheduled tribes depended upon natural forest for food in the seasons when crop could not be cultivated. Their conditions have worsened with the depletion and degradation of forests. Traditional sources of free food are no longer available. Purchased foods are neither available nor are affordable to them. Hence malnutrition and starvation are widely prevalent among them.

Rahman and Rao (2002) conducted a study on the food habits of adults with special reference to daily intake of food and nutrients by Hindus and Muslims residing in an urban area of Hyderabad using 24 hours recall oral questionnaire method. They also studied the association between dietary intake and the personal profile of subjects such as sex, religion, education and income levels. They observed significant difference in the dietary pattern and nutrients consumed by the two groups. The Muslims of low education and lower per capita income consumed more cereals and millets and flesh foods than the Hindus. No such difference was found between the groups with higher education and higher per capita income. Consumption of fleshy foods was higher among the Muslims than the Hindus at all levels of education and per capita income. Consumption of milk and milk products, fat and edible oils were more among the Hindus than the Muslims irrespective of education and income. The caste system, as it has deep roots, and is

inturned with the religion, in India religious practices associated with food may have a bearing on food and nutrition security.

2.3.7 Family size

Khan *et al.* (1994) reported that type and size of the family, education of mother and type of house are reported to be some of the socio-economic factors which determine the nutritional and health status of the population.

According to Von Braun and Lorch (1991) food insecure households tend to be larger and have a high number of dependents and have a younger age composition. Ownership of land or access to even small pieces of land for farming had a substantial impact on the food security status of rural households.

Geetha and Devadas (1990) reported that increased family size had an adverse effect on the nutritional status of every member of the household. They also remarked that family size is a mark of social and economic status and that with social changes more number of nuclear families have emerged which has affected the life style of families both in rural and urban sector. According to Thimmayamma (1983) large family size would result in improper food distribution among family members of agricultural labourers mainly due to low purchasing power and faulty food habits. Yasoda (1990) is of opinion that a given income level, households with more young children have higher rates of under nutrition because of competition for household resources. Thus the family size along with the composition of the family would affect the availability and access to food which are the two dimensions that may affect household food security directly.

2.3.8 Employment

Food access depends on access to income and regular employment as stated by Anthony and Chatterjee (1999). According to Rath (1999) not

only the employment but also the quality of employment and wage rates are important for poverty alleviation. He has further ascertained that casual employment leads to uncertain livelihoods whether it is within agriculture or outside agriculture. The author has also announced that the higher the existence of casual employment, the larger will be the risk of being out of employment and the risk of transient food access and food insecurity.

Unni and Jeemol (1997) have reported that in recent years, there has been casualisation of labour and workers move between employment and unemployment on a daily basis. If unemployment is more, there will be wide spread poverty.

According to NSSO (1993) employment rates varies between different states. Unemployment is one of the reasons for the poor, to take up whatever work they get. They cannot afford to remain unemployed, as they need to earn money that allows them to buy enough food for sustenance. Meena (1991) through her studies found that absence of employment opportunity in the industrial and service sectors, the rural families have no source of employment which directly affects the income and purchasing power and it is estimated that over 45-50 per cent of the rural families are presently living in poverty and area threatened by food insecurity.

2.3.9 Illiteracy

In the latest report published by MSSRF (2001) it has been indicated that causes of persistent food insecurity are illiteracy, poverty, discrimination and neglect.

Schultz (1990) reported that rates of under nutrition in children are strongly related to women's educational levels.

Behrman (1990) conducted a study on landless agricultural labourers and found that illiteracy among women was as high as 60 per cent which affected the nutritional status of their children.

Devadas *et al.* (1991) reported that the incidence of infectious diseases were higher among family members if the mother was illiterate.

Swamy *et al.* (2000) in a study conducted among the farmwomen labourers of Bangalore observed poor nutritional status and deficit intake of all foods among them. This condition was found to be due to morbidity, illiteracy and low purchasing power, which are the root cause of nutrition insecurity.

2.3.10 Education

Education and wage variables are found to have significant impact on the household nutrient demands as observed by Gawn *et al.* (1991). They also observed that these have very different effects on the nutrient choices of low calorie households than on the nutrient choices of high calorie households.

Rajikabhandari and Smith (2000) found that education level of the male and female heads of households have a differential impact on food consumption pattern. Female education has an effect on the consumption of nutritious and preferred foods that was independent of the effect of income; male education on the contrary, had an effect on the consumption of these foods only when it interacted with income.

According to Herz and Khandkar (1991) women's education is important for improving the health and nutritional status of children. Women with higher education were found to have better health practices, protecting their children from exposure to disease. Wolfe (1991) reported that maternal education reduces child mortality by five to ten per cent and it also improves the nutritional status of children. The inter relationship between morbidity, mortality with household food insecurity has been well established.

2.3.11 Food prices

Panicker (1992) reported that if income lowers at a slower rate than food prices, the purchasing power is diminished. Thus the poor will have access to only smaller amount of food, leading to inadequate calorie consumption. According to Varma (2000) deficient calorie consumption at least among the poor would be due to the mismatch of income and prices. He further remarked that the price and seasonal variations in prices further leads to transitory food insecurity. Transitory problem of loss of work and loss of income also adds to the problem. Bigman (1992) is of the opinion that increase in food prices reduces the purchasing power of the landless, rural and urban workers who may find it no longer possible to provide their household's food requirements how ever small it may be.

Srinivasan *et al.* (1991) found that poor intake of foods and most of the nutritional problems of rural households can be traced back to their low purchasing power and rising prices of essential commodities. Low purchasing power in association with hike in price of essential food commodities would ultimately pave way to food insecurity.

2.3.12 Male-female wage differentials

Agnihotri and Satish (2000) reported that wage differentials exist in both agricultural and non-agricultural work, where men are paid more than the women for the same work. This would affect their food and nutrition security.

According to Sheriff and Abusaleh (1999) women earn less than men. Earning capacity of women which is less than that of men has an impact on the bargaining ability of women in the households. Ranade and Sudarshan (2001) reported that gender divergence in agricultural and non-agricultural work and in real wage rates creates gender inequalities in the access to necessities within households, including food.

2.3.13 Food and nutrient intake

Sukhatme (1990) made a special study of the Indian food problem from the nutritional angle and reported that at least one in every four and probably one in every three of India's population is under nourished, which means that they do not have a minimum quantity of food in terms of minimum calories.

Swaminathan (1996) while examining the food security enjoyed by Indians especially women and children, remarked that there seems to be a alarming deficit even in the consumption of cereals, the elementary component of meals and their diets are without other essentials like milk, fish, egg, fruits and vegetables.

According to Vijayalakshmi (1993), the diet consumed by the expectant women of low-income groups in Tamil Nadu was deficient in all the nutrients and the percentage deficit ranged from 8 to 83 per cent and that inturn has affected their food security, negatively.

UNICEF (2001) reported that the daily intake of calories by children and women in middle income, Indian families were low and that it was worse among lower-income groups; for example children in the pre-school age were found to consume only 685 kilo calories of energy against the RDA of 980 kilo calories. They have further stated that the average food intake by school age children was sufficient to meet only up to 80 per cent of their total need. Adolescents were reported to be able to meet only 70 per cent of their calorie requirement through the food that they consumed while on an average, adult women were able to meet only 89 per cent of their calorie requirement of 2120 kilo calories. This international organisation has also remarked that besides calorie intake the nutritional as well as health status of children and women of India reflects the level of food insecurity.

Swaminathan (2001) has stated that the households are not a homogenous unit and women and girl children tend to suffer from endemic hunger. He has endorsed that even with impressive production and

productivity in agriculture, horticulture, dairy, poultry and fishery, the per capita consumption as well as the calorie intake of vast majority of the rural population especially women and children is alarmingly distressing.

Paul (1993) conducted a study among higher income strata on the dietary changes among adolescents and found that, there is increased intake of legumes, vegetables, milk and animal foods. Substitution of coarse grain by more prestigious, polished ones, reducing overall intake and 50 per cent reduction in fiber, increase in intake of dalda, butter, ghee, sugar and sweets have also been reported. High nutrient dense foods and vegetable based dishes were not much preferred by these populations.

Studies conducted by KAU among 225 toddlers residing in coastal, slum, suburban and rural areas of Kerala and found that there was all-round deficiency in the consumption of foods except that of staple foods like cereals and roots and tubers among toddlers belonging to farming community and coastal areas respectively. The requirement for green leafy vegetables, milk and milk products, fat and sugar were found to be met only to less than 50 per cent of RDA. Vegetable consumption of toddlers belonging to farming communities (>70 %) and those belonging to backward district *viz.*, Malappuram (> 9 %) were better than their counterparts residing in slum areas and other rural areas (Prema, 2000).

2.3.14 Rural urban difference

According to Agarwall (1990) the food consumption of rural population was lower than the minimum requirement for physical sustenance and healthy living. Swaminathan (2002) was of opinion that inadequate livelihood opportunities in rural areas results in household nutrition insecurity. Arokiasamy and Rao (2001) conducted a study among 450 families consisting of 2276 individuals belonging to rural and urban households of Tamil Nadu. They found that dietary quality and quantity were better in urban households than in rural households. The households especially of the urban area consumed more amounts of

protective foods, protein and energy rich foods as against the poor rural households. The above authors had further ascertained that possession of assets and female literacy were found to improve dietary habits and adequacy of diet consumed by urban households.

A study conducted among the rural households of Tamil Nadu, by Silva *et al.* (1990) indicated that the well being as measured by the quantity of food consumed by the farmers were far from satisfactory.

Noroozi (1994) conducted a study among rural population in Iran and found that food demand of the lower class is mainly based on cereals. Members of this class were not able to use animal protein specially beef. The author reported that each urban member of this class was found to utilise 1600 calories, while a rural member were estimated to consume per day and she felt that food shortages and food insecurity among members of this class were often the cause of malnutrition. It was also announced by the same author that approximately 25.00 per cent of the families in the lower class face food insecurity. They buy cheaper food or eat less, both of which can cause malnutrition in society.

2.4 ASSESSING HOUSEHOLD FOOD SECURITY STATUS

Several indicators and methods have been used to assess levels of household food security.

According to Harris (1990) assessment of household food security status or level involves measurement of household food availability and average household food consumption levels over a period of time.

Bouis (1990) has suggested the use of dietary energy intake surveys (kcal/caput/day) as a basic way using which household food security status had been assessed in the past and the average calorie intake of each household was assessed for one month at a time, and repeated every three months for a year *ie.*, four times. This was reported to give estimates of typical consumption levels, four times, generally covering seasonal changes. The author had further pointed out that energy intake estimates

can be made using existing household survey procedures like expenditure on food item, record of quantities purchased, harvested or taken from the store, weighing of quantities of food prepared and measurement of the quantities of food used for consumption.

About total food expenditure by Jonsson and Toole (1991) had reported that the percentage of total expenditure on food may be obtained from household budget surveys. Since the poor spend a large part of their income on food as income increases; the proportion of the income spent on food remains steady initially. As the food needs begin to be satisfied proportion of expenditure begins to fall. This relationship can be used to interpret food expenditure proportion, as an indicator of the level of household food security and those who spend a large portion of available resources on food remain food insecure.

Randimer *et al.* (1990) has suggested that dietary pattern and food choices are indicators of food security. According to them such data may be obtained from household surveys and they have indicated that most food insecure may be found by factors such as those buying the cheapest and less preferred staple or buying only small amounts of preferred foods such as animal products. They have further mentioned that dietary pattern and food choices can be obtained by observing the number of meals per day cooked / eaten by the households.

USDA (2000) has opined that experience of hunger are closely related to household food insecurity and achieving freedom from hunger probably means much the same as attaining food security. Thus the above organization has suggested that a direct measure of hunger would be very significant in assessing food security. They have suggested that to assess the hunger profile questions on quantity of food and quality of food consumed, anxiety in the household related to food and deprivation of food among individuals and social dimensions associated with acquiring food (unacceptable means for acquiring food, disrupted eating pattern etc) may be asked and answers may give an indication of food security.

Questions concerning different aspects pertaining to women and children (*viz.*, whether women consider that they cannot afford to eat, whether mothers can give their children a balanced meal and whether they feel that they are not eating enough because they cannot get access to enough food etc) can provide better results in examining the hunger profile of households, as explained by the United States Department of Agriculture.

Shetty and James (1993) has ascertained that changes in adult anthropometry is related to changes in household food security. They have further stated that there is a strong evidence that weight of adults fluctuate seasonally and that it is related to socio-economic status and age, Krasovec *et al.* (1991) has maintained that measurement of height and weight is relatively easy to do on adults and errors in measurement are not as critical as with children. George (1999) is of the opinion that anthropometric informations are useful components because they are measured at individual levels and that changes in weight variations in pre-school children could provide reasonably upto date assessment of changes in household food security.

FAO/WHO (1992) and George (1999) are of the opinion that anthropometric information are useful complements because they are measured at individual level. Moreover, Franke and Chasis (1989) are of the view that anthropometric indicators convey a much better picture about Kerala than the nutritional intake measures.

Observations made by Teklu *et al.* (1991) revealed the fact that food prices seem to give short run prediction of changes in nutritional outcome. They have expressed their view that prices may be analysed in relation to the minimum wage eg: number of days of work required to purchase a food basket. One draw-back in using the minimum wage itself is that it tends to vary frequently.

The MSSRF (2001) has calculated food security of India using five indicators related to food availability, eight indicators related to food access and six indicators related to food absorption. The five indicators of

food availability are deficit in food production over consumption, instability in cereal production, environmental sustainability index and number of people affected by floods, cyclones, heavy rains, land slides and percentage of area affected by drought to total geographical area. The food access indicators are average per consumption unit per day calorie intake, percentage of population consuming less than 1890 kcal per consumption unit per day, percentage of population below poverty line, percentage of persons in labour households to the total production, rural infrastructure index, juvenile sex ratio, percentage of literate females to total female population and percentage of scheduled caste and scheduled tribe population to the total population. Food absorption indicators identified by them are, percentage of population with CED, life expectancy, percentage of severely stunted children under the age of five, percentage of severely wasted children under the age of five, infant mortality rate and health infrastructure index.

Several other methods have been suggested to assess food security. Participatory poverty assessment and indepth analysis of the livelihood of the poor (Salih, 1995), 18 item household food security scale, (Blumberg *et al.*, 1999), core food security measure (Derrickson *et al.*, 2001) 24 hours recall with one day weighment and monthly food purchase inventory for cereals and pulses (George and Daga, 2000) are reported to be some of the specific methods.

George and Daga (2000) is of the opinion that food security at the household level is best measured by direct surveys of dietary intake.

Krishnakumar (2000) is of the opinion that food security of Kerala can be detected by measuring nutritional status of the population especially of the vulnerable sections.

2.5 FOOD SECURITY OF LABOUR HOUSEHOLDS

According to Adelman (1991), the largest sub-group among the chronically under nourished consists of small farmers, landless rural

workers and urban non-professionals. In normal times, they manage to subsist although distribution problems within the households may still leave certain members of the family, notably young children and lactating mothers, undernourished. These families typically spend the bulk of their income on staple foods and basic necessities. A rise in the price of food grains or a fall in the family income deepens their food deficiencies and forces them to cut even the basic nutrients.

Inadequate calorie consumption is seen among the lower expenditure groups and among certain populations engaged in specific occupations. Of the total rural households in India, about 66 per cent are cultivator households, 14 per cent are landless agricultural labourers and four per cent are artisan households. The rest belong to other classes.

FAO (1996) has reported the classification of households according to income criteria as those dependent upon labour income and those dependent upon farm income and they found that 45 per cent of the households in the country (India) were labour households. Joshi (2000) is of opinion that those who have access to land and who produce food are likely to be more food secure than the landless. The evidence available from the NSS 50th round data has revealed that the number of sub-marginal cultivators, (cultivating less than one acre roughly less than 0.40 hectares) are also equally food insecure. For the country as a whole 49 per cent of the landless and about 29 per cent of the sub-marginal farmers consume less than 2300 kcal per consumer unit per day (Praduman, 2000).

Minha (1991) revealed that among different states Tamil Nadu has the highest percentage (27.00 %) of landless labour. They have further reported that the landless labour households consuming less than 2300 kcal per capita per day constitute about, 77.00 per cent of the total rural households of Tamil Nadu. Parasuraman and Unnikrishnan (2000) had reported that Tamil Nadu seems to have the largest number of food insecure

cultivators, constituting 43.00 per cent of all cultivators followed by Maharashtra, and Assam with 42.00 per cent each.

According to Mukherjee *et al.* (1994) the number of land less labourers is low in Kerala, while the number of small landowners is high in the state. The authors have further remarked that 55.00 to 65.00 per cent of the landless labourers belonging to food deficient state such as Tamil Nadu, Assam, Karnataka, Kerala, Maharashtra and Gujarat consume diets deficient in calories.

Laisamma (1992) found that the food consumption pattern of agricultural labourers of Thiruvananthapuram were found to be better in relation to certain major food articles like cereals and pulses, because of the high income. Items like rice, tapioca, fish, coconut, locally cultivated vegetables, milk, cooking oils and sugar were the main items in the daily diet of agricultural labourers of Vellayani.

Sujatha (1990) revealed that most of the labourers engaged in stone-breaking had diets that were inadequate in all the food articles except roots, tubers and fish. Their diets were found to be deficient in retinol, iron, thiamine, riboflavin, niacin and vitamin C.

A study conducted by Bansal and Mehta (1989) on brick-kiln workers pointed out to the fact that green leafy vegetables, fats, oils, milk and milk products, sugar and jaggery were deficient in the diets of these workers. However the consumption of roots and tubers, cereals and millets were above the RDA. Vitamin C and energy were found to be the most deficient nutrients in the diet of these workers.

According to Nayak (1993) the diet of the fishing community of the south west coast of India consisted of rice and fish as primary items. They also included vegetables, fruits, meat, pulses, oil, milk and egg but the inclusion of these items varied according to the economic status, with the poor group consuming lower amounts of pulses, egg and milk and no meat. The consumption of tapioca was high among this group.

Prema (2001) had reported the extent of food security among households below poverty line in Kerala and indicated that most of the poor households had calorie deficiency. The author has also identified households of labourers, small scale entrepreneurs in the formal sector, urban population and those residing in low potential areas are at risk of food security.

2.5.1 Prevalence and nature of food security

About 800 million people in the world are considered to be food insecure. As explained further by Paroda (1999) every six person is hungry and about 185 million children under age of six are seriously under weight and more than one billion people do not get clean water.

Hong (2002) had conducted a study in Korea to find out the association between household food insecurity and nutritional status of children from low-income families, living large cities of Korea. This study that included 370 children aged between 4-12 years and adults, measured household food security using body size and dietary intake and found that 28.4 per cent are food insecure among adults and 25.7 per cent of children from most food insecure households had the lowest nutrient intakes.

The National Nutrition Survey carried out in New Zealand brought forth the fact that prevalence of food insecurity was significantly higher among females compared to males (Parnell *et al.*, 2001).

Green *et al.* (1998) studied the food security and nutritional status of drug users and non-drug users in low income families of Hartford, USA using food frequency questionnaire and anthropometric measurements. The findings suggest a high degree of poverty among all participants of the study but in particular among drug users since the drug users were less likely to consume vegetables and fish. All anthropometric measurements except height were significantly lower for drug users, and they were also found to maintain poor nutritional status.

From three case studies reported from Gambia, Guatemala and Rwanda it was classified by Von Braun (1990) that a ten per cent increase in income resulted in a 3.5 to 4.9 per cent increase in household food energy consumption and a 1.1 to 2.5 per cent increase in weight for age of children.

Haddad *et al.* (1991) conducted a study among 323 households of Philippines and found that average calorie adequacy was about 80 per cent of requirements (that is not food deficient in a calorie sense), 197 dipped below 80 per cent at least once during a 16-month period.

Von Braun and Paulino (1990) reported that in African countries a close relationship is found between domestic food production, regional and local food availability and household food security. They also observed that malnutrition is widespread and that a number of households may be food insecure. If the food supplies are adequately distributed, it is adequate to meet nutritional need.

A comparative study between rural Bangladesh villages with better infrastructure development and poor infrastructure development done by Zaki *et al.* (1991) revealed that most (12.00 %) of the households of better infrastructure development (gauged by a number of criteria) were food insecure compared to 20.00 per cent in villages with poor infrastructure. This difference is explained by higher income and lower prices of marked items.

The latest reports providing the most recent statistics on the food security of US households showed that the prevalence of food insecurity fell by 11.3 per cent and the prevalence of hunger due to inadequate resources fell by 15.6 per cent between the year 1998 and 2000. According to USDA in the year 2000 33.2 million people in USA are living in food insecure households.

2.5.2 Food security of India

The MSSRF (2001) has calculated food security of India based on five indicators for food availability, eight indicators for food access and six indicators for food absorption.

Based on the indicators of food availability, food access and food absorption, M.S. Swaminathan Research Foundation has identified Bihar, Jharkhand, Chattisgarh, Madhya Pradesh, Uttar Pradesh, Rajasthan and Orissa as “the most food insecure states” of India. “Moderately food insecure states” are reported to be Andhra Pradesh, Assam, West Bengal, Haryana, Uttaranchal and Gujarat and “the food secure states” are Punjab, Himachal Pradesh, Kerala, Tamil Nadu, Maharashtra and Karnataka.

Kannan (2001) has observed that as in the case of several developmental indicators, the state of Kerala presents an interesting case in the matter of food security while Kerala has a lower level of average intake of food among other states. It is in the forefront in such food security indicators as poverty, infant mortality and life expectancy.

But Suryanarayana (2001) is of the opinion that with high levels of poverty and inadequate domestic food grain production, Kerala is one of the most food insecure state in India and 80.00 per cent of the population suffer from inadequate calorie intake. However the contrasting observation is that the share of households having two square meals a day was found to be lowest in Kerala as per the 45th round of survey conducted by NSS during 1993-94.

Kannan (1999) has further opined that food security in Kerala has been ensured by three important components *viz.*, availability of PDS for all households, supplementary nutrition programme for children in the age group of 0-4 and 5-12 and old age pension for the poorer sections.

Materials and Methods

3. MATERIALS AND METHODS

The methodology adopted to assess the household food security of the target population of the study are detailed in this chapter.

The technical programme of the case study comprised of :

- 3.1 Selection of families
- 3.2 Conduct of socio-economic survey
- 3.3 Identification of family risk factors
- 3.4 Measurement of physical quality of life
- 3.5 Determination of availability, access and utilisation of household food resources
- 3.6 Evaluation of ability of the selected households to maintain household food security
- 3.7 Assessment of overall household food security
- 3.8 Analysis of data

The methods and tools used to cover the technical programme and to meet the objective of the study are outlined below.

3.1 SELECTION OF FAMILIES

As envisaged in the programme Kalliyoor panchayat was identified as the locale of the study, because several landless agricultural labourers were residing in this area.

Being a case study, 15 families of agricultural labourers were selected purposively as the target population. The criterion behind this selection was that there will be at-least one male wage earner in that family whose major source of income is from agricultural operations and who could be labelled as landless “agricultural labourer” from a practical point of view.

3.2 CONDUCT OF SOCIO-ECONOMIC SURVEY

As a primary factor that determines household food security a socio-economic survey was undertaken among the selected families. A specially designed questionnaire capable of eliciting social, cultural, economic and personal details of these families and its members was developed for the survey. Using the pre-tested questionnaire details were collected by interviewing the head of the family in the presence of his or her spouse.

3.3 IDENTIFICATION OF FAMILY RISK FACTORS

It is logical that family risk factors of different nature might jeopardise household food and nutrition security by altering availability and utilization of resources. Hence the presence of risk factors which may have a direct or indirect influence on nutritional status and/ or food security especially of children were assessed using the scale developed by Srilatha and Gopinathan (1995). Those households which secured a score above '4' were categorized as "at risk".

3.4 MEASUREMENT OF PHYSICAL QUALITY OF LIFE

The physical quality of life enjoyed by the households to some extent might reflect the food security status of a particular household; though it might not essentially depict the nutritional security enjoyed by them. In this context the Rural Quality Life Index (RQLI) of the 15 households were worked out using a modified version of RQLI suggested by Dhanasekharan (1991).

Interview with an adult member of the family coupled with observation followed by scoring was used to quantify the family risk factors as well as physical quality of life of the households.

3.5 DIETARY SURVEY

A detailed general dietary survey was conducted among the families using a specially designed questionnaire. The data was collected by verbal autopsy, using the pre-tested questionnaire. The data was collected from the housewife of the family. A pilot survey was also conducted to check the adequacy of the questionnaire as a preliminary step.

3.6 DETERMINATION OF AVAILABILITY AND ACCESS OF HOUSEHOLDS TO FOOD RESOURCES

Checking the availability and access of households to food resources was used as a direct step initially to assess food security. This was done through two channels namely :

3.6.1 A household food purchase inventory

3.6.2 A weighment survey

3.6.1 Household food purchase inventory

A household food purchase inventory was conducted using an inventory schedule specially designed for the study. The inventory schedule was kept in the custody of an educated member of each household. These nominated members were trained to record the details of food purchased by the households on a daily basis. Details such as the nature of item purchased, quantity per purchase, cost of items purchased, source of purchase, purchase done in cash or credit etc. were recorded in the inventory schedule by the trained member. The investigator checked the records once in two days, so as to ensure the correctness and completeness of the data entered. The food inventory data was collected continuously for a period of one month from each of the fifteen households.

The food purchase inventory was repeated by replicating the aforesaid methodology once again after a lapse of three months so as to

check variations in food purchase behaviour which may influence the level of household food security. This procedure was also undertaken as a step to see whether the households are able to maintain their food security over a period of time.

3.6.2 One-day weighment survey

Weighment survey was carried out to assess the food consumption pattern of the families. One-day weighment survey was conducted using the standard technique suggested by Thimmayamma and Rau (1996).

The weighment survey was conducted on a whole day basis. In this method, the meal menu and the weight of each of the raw foods that has gone into the menu of each meal' and the weight of cooked foods were measured on a random day. The quantity of food consumed by each member of the family was also measured, and recorded. Food intake per consumption unit and intake per person per day were calculated from the above data using the formula suggested by Thimmayamma and Rau (1996).

From the actual food intake data, nutrient intake was calculated by referring to food composition tables which provide information on quantities of different nutrients, such as proteins, vitamins, minerals, calories etc. per 100 g of edible portion of food. The nutrient intakes were expressed per consumption unit (Cu) and also per capita.

The adequacy of the diet consumed was assessed by comparing the actual food and nutrient intake with recommended nutrient and dietary allowances.

3.7 OVERALL HOUSEHOLD FOOD SECURITY

The overall household food security was measured by a two way process.

a) Initially it was measured using the modified version of indicators suggested by Chung *et al.* (1991). This checklist was also used to assess

the coping mechanisms adopted by the households to overcome food insecurity, if any

Data was collected using the check list administered to the head of the family in the presence of the spouse or another adult member of the family by direct interview method.

b) The extend of food security among the households were also measured using the Food security / Hunger core module (3-stage design, with screeners) formulated by USDA (1999). The food security data was collected using this format by interviewing the adult female of the family which was followed by scoring.

3.8 ANALYSIS OF DATA

Data collected through the above mentioned procedures (a to g) were analysed using suitable statistical tools such as χ^2 , principal component analysis to assess the extent of household food security enjoyed by the selected families and to identify major factors that influence their food and nutrition security. Nutritional status index, food security index were also developed to identify the level of nutritional status and food security of each of the families.

Results

4. RESULTS

The results of the study entitled “The extent of household food security of selected families of landless agricultural labourers of Kalliyoor panchayat-a case study” are presented under the following headings.

- 4.1 Socio-economic profile of the families
- 4.2 Physical quality of life
- 4.3 Poverty index of families
- 4.4 Dietary habits of the families
- 4.5 Food purchase inventory
- 4.6 Monthly food expenditure pattern of the families
- 4.7 Actual food consumption pattern of the families
- 4.8 Actual nutrient intake of families
- 4.9 Actual food intake of family members
- 4.10 Actual nutrient intake of family members
- 4.11 Energy balance and adequacy among employed adult members of the families
- 4.12 Anthropometric measurements of family members
- 4.13 Clinical status
- 4.14 Haemoglobin level
- 4.15 Nutritional status index
- 4.16 Measurement of household food security using selected indicators
- 4.17 Assessment of household food security using food security/hunger core module
- 4.18 Food security index

4.1 SOCIO-ECONOMIC PROFILE OF THE FAMILIES

The socio-economic profile of the families were assessed using a structured schedule by interview method. Parameters included to analyse the socio economic status were religion, caste, type of family, nature of

assets, family income, ownership of land, housing conditions and family expenditure pattern. Further, the educational status, employment status and extent and nature of social participation by the members of the families as well as utilization of community facilities were taken in to account. The results of the data collected on these lines are presented below.

Religion and caste are found to be two important variables that determines the social status of families in a tradition bound social situation that prevails in India. Hence these two parameters were taken into account and it was found that 80.00 per cent of the subjects belonged to Hindu community while 20.00 per cent were Christians (Table 1).

Table 1. Religion and caste-wise distribution of families

a. Religion	Number	Percent
Hindu	12	80.0
Christian	3	20.0
Total	15	100
b. Caste		
Forward caste	1	6.67
Backward caste	1	6.67
Other backward caste	2	13.33
Scheduled caste	11	73.33
Total	15	100.00

Caste wise analysis revealed that majority (73.33 %) belonged to scheduled caste communities, while only 6.67 per cent belonged to forward communities. It was also seen that the remaining 20.00 per cent belonged to backward classes.

Analysis of available data on demographic profile of the families revealed that except one family all others (93.00 %) were of a nuclear type having small family size consisting of less than five members. The total population size spread over these 15 families was only 56 and the average family size was 3.7.

The educational status of the family members surveyed as presented in Table 2, revealed that 32.14 per cent had primary level of education.

Table 2. Distribution of family members in accordance with their level of education

Level of education	Distribution of family members	
	Number	Per cent
Adults Illiterates	4	7.14
Primary	18	32.14
Secondary	10	17.85
High School	16	28.60
Pre-degree/certificate course	6	10.80
Graduate	1	1.78
Post graduate	1	1.78
Total	56	100.00

The data further revealed that 28.60 per cent had high school level of education while six members (10.80 %) had completed either their pre degree course or a certificate course. It was interesting to note that though there were one graduate and a post-graduate there were four illiterates too in these families. When the data was analysed sex wise, it was seen that, among the four illiterates, three were women and that the males had a better educational status than the females.

The composition of the families based on age, sex and level of activity are given in Appendix I. Data presented in Table 3, represents the age and sex wise distribution of members belonging to the families under focus. The data revealed that there was an equal number of males and females. However when the age was taken into account, the number of adults (40) exceeded the number of children (16).

Table 3. Age and sex wise distribution of the members of selected families

Age (years)	Distribution within the male population		Distribution within the female population		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
Children						
4 – 6	0	-	2	7.14	2	3.58
7 – 9	0	-	1	3.58	1	1.78
10 – 12	4	14.28	2	7.14	6	10.71
Adolescence						
13 – 15	3	10.71	2	7.14	5	8.92
16 – 18	1	3.58	1	3.58	2	3.58
Total	8		8		16	28.57
Adults						
Heavy	16	57.14	-	-	16	28.58
Moderate	1	3.58	3	10.71	4	7.14
Sedentary	3	10.71	17	60.71	20	35.71
Total	20		20		40	71.43
Grand total	28	100.00	28	100.00	56	100.00

Among the adults, 50.00 per cent were men and the remaining were women. The age of the men ranged between 21 to 60 and that of the women ranged from between 19 to 55. Out of the 20 adult men, 16 were heavy workers, one was a moderate worker and three were sedentary workers. The 16 heavy workers came from all the 15 families as there was one in each of the families with the exception of family no. 11, where there were two. The three sedentary workers were from family no. 3, 10 and 4 and remaining one moderate worker belonged to family no. 9 as shown in Appendix I.

When the number of adult females were taken into account, it was clear that out of 20 female adults, 17 (60.00 %) were sedentary workers. With the exception of family no. 10 and 11 all other families had one female worker each engaged in sedentary type of work. There were three females (15.00 %) doing moderate type of activity who belonged to family no. 3, 10 and 15 (Appendix I).

The age of children in these families varied from 4 to 18, and there was a dominance of school going children belonging to the age group of seven to fifteen years. No difference in the sex wise distribution could be observed among the children also (eight each). The absence of infants and toddlers in these families is a special feature. And that there were only seven adolescents out of 16 children.

The family composition as given in Appendix I also revealed that only eight families (53.00 %) had children and their age ranged from four to eighteen in the case of girls (who constituted half of the child population) and the boys were of ten to eighteen years of age.

Further analysis of family composition revealed that among the adults only 67.00 per cent were employed of which 35.00 per cent were males and the remaining were females.

Table 4. Distribution of families according to the number of persons employed

Number of employed members	Families	
	Number	Per cent
1	6	40.00
2	7	46.66
3	1	6.67
4	1	6.67
Total	15	100.00

As indicated in Table 4, it was seen that seven families (46.66 %) had two employed members each, while six families had one member employed and 6.67 per cent had three members employed and remaining one family (6.67 %) had four members employed.

As far as the nature of employment was concerned, their main occupation was agriculture. However, there were a few (29.00 %) who had taken up agriculture related activities as well as non-agricultural activities (25.00 %) especially during lean seasons. Three members from family no. 10 (mother, son and daughter) were engaged in giving tuitions, though the mother would go for agriculture related jobs whenever it was available. There was one lady from family no.3 who was employed as a maid while one man from family no.9 was engaged in fixing of tiles in buildings.

Out of the employed members, only 30.00 per cent had a permanent kind of employment, others being casual workers. Therefore 60.00 per cent of the employed members had work only for less than six months (but more than two months) while the remaining were employed for six to ten months annually. Further analysis of the employment data are presented in Table 5 and 6.

The distribution of respondents with respect to the days of work on an average per week varied from 2 to 6. Average working weeks per month as given in Table 5, revealed that 55.55 per cent had employment for three weeks in a month while 33.33 per cent worked throughout the month and 11.11 per cent had it for two weeks on an average in a month.

Table 5. Distribution of employed persons with respect to the average working day per week, working weeks per month, working month per year

Average working day per week	Distribution of respondents		Average working week per month	Distribution of respondents		Average working month per year	Distribution of respondents	
	No.	Per cent		No.	Per cent		No.	No.
2	2	7.40	2	3	11.11	2	2	7.40
3	15	55.55	3	15	55.55	9	1	3.70
4	1	3.70	4	9	33.33	10	16	59.25
5	3	11.11				12	8	29.63
6	6	22.22						
Total	27	100.00		27	100		27	100

The data on average working months per year showed that 59.25 per cent had ten months of employment while 29.63 per cent had work throughout the year. Two respondents (7.40 %) had only two months of employment and the remaining 3.70 per cent had it for nine months on an average in a year.

Table 6. Distribution of families according to the days of employment in a month

Days of employment in a month	Distribution of families	
	Number	Per cent
8 – 12	7	46.67
13 – 17	2	6.67
18 – 22	5	33.34
> 23	1	6.67
Total	15	100.00

The distribution of families according to the days of employment in a month revealed that the average days of employment in a month ranged from 8 to 25 days. It was seen that about 46.67 per cent of families had employment ranging from 8 to 12 days in a month, while 33.34 per cent had employment for 18 to 22 days. The average days of employment in a month was worked out to be 15. The employment data in general revealed that majority of the subjects had only two to three months annually as lean season of work. While about 60.00 per cent of the respondents had moderate level of employment for seven to nine months.

Like the nature of work, the duration of work done by the employed persons also varied, between 6 ½ hours to 8 hours in the case of males and four hours to eight hours in the case of females. It was seen that 12 out of 19 male members worked for 7 to 7 ½ hours while about 26.00 per cent worked for eight hours. As far as the females were concerned only one member was occupied for a period of eight hours, while 50.00 per cent had a work time of 7 to 7 ½ hours. Three members (37.50 %) among the females were doing work for only four hours mainly because they were engaged in non-agricultural work (two were engaged in tuitions and other was a maid).

It was seen that, among the males all except one took a leisure time of one hour during the mid day, while the leisure hours for the female workers varied from half an hour to two and a half hours depending on the type of work that they were engaged in, though majority (75.00 %) had a leisure time of one hour.

As income and food security are found to be related to one another the annual income of the families were assessed and the data was presented in Table 7.

Table 7. Distribution of families according to annual income

Annual income of the families in range (Rs.)	No. of families	Percentage
10,500-30,500	9	60.00
30,501-50,500	3	20.00
50,501-70,500	1	6.67
70,501-90,500	0	0.00
90,501-1,10,500	2	13.33
Total	15	100.00

As shown in Table 7, it was observed that 80 per cent of the families had their income ranging between Rs.10,500/- to 50,500/- and within this segment 60 per cent had it below Rs.30,500/- but above Rs.10,500/-. It was also observed that about 13 per cent of the families had a higher rate of income when compared to other families, since their income was around one lakh rupees (Rs.90,500/- to 1,10,500/-).

The annual income of the families was calculated from the wages earned by the subjects of individual families and also from the subsidiary income earned through cultivation of vegetable crops done in leased land. Except five families 60.00 per cent had leased out land varying from 8 to 48 cents.

It was seen that those who had leased out land, they had cultivated the entire area and the crops included banana (Nendran and Red), cucumber, ladies finger, amaranthus and string beans (vegetable cowpea). Most of them had a combination of three or two vegetables with banana, except one family who had a single crop of banana.

From this they had reported an annual income which varied from Rs.6,100/- to 17,025/- and 40.00 per cent of the families had earned more than Rs.12,000/- annually from this subsidiary occupation, which has improved their annual income substantially.

The average family income on an yearly basis was found to be Rs.49,456/-. This figure was arrived by averaging the income earned by the families and accrued over a period of 12 months during the year 2002.

Being agricultural labourers, variation in income due to intervening lean seasons and seasons of hectic activity were observed. Hence the monthly income was also worked out. The monthly income was found to range from Rs.1,000/- to 10,000/- as shown in Table 8.

Table 8. Distribution of families according to average monthly income

Monthly income (Rs.) (Range)	No. of families	Percentage
1000-2500	7	46.67
2501-4000	4	26.67
4001-5500	1	6.67
5501-7000	2	13.33
7001-8500	0	0.00
8501-10000	1	6.66
Total	15	100.00

The economic status of families depends not only on their income, but also on the expenditure pattern. Expenditure on food is one of the important and unavoidable items of family expenditure.

The data revealed that the monthly food expenditure of 15 families surveyed varied from Rs.500/- to 1800/- (average expenditure being Rs.1,195/-) Out of these 15 families, 53.33 per cent *i.e.*, eight families (family no. 1, 3, 5, 6, 9, 11, 13 and 14) were observed to spend from Rs.1001/- to 2000/- on food. Seven families (family no. 2, 4, 7, 8, 10, 12 and 15) (*i.e.*, 46.67 per cent of the families) were spending an amount less than Rs.1,000/-.

While analyzing the expenditure on food family no. 6 was found to have the highest expenditure and family no. 4 was revealed to have the lowest expenditure as shown in Table 11.

The expenditure incurred on various non-food items also reflects another aspect of the quality of life. Hence relevant data were collected from each of the 15 families as part of the socio-economic survey. The expenditure on non-food items on a monthly basis is given in Table 9.

Among the non-food items clothing and education of children are the unavoidable items of expenditure that take a sizable portion of income. In the case of clothing and education the yearly expenditure of 15 families were collected and from this data the average monthly expenditure was worked out, since the expenditure on these items were not incurred on a monthly basis.

From Table 9, it was evident that 80.00 per cent of the families *i.e.*, 12 families (family no.1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14 and 15) were spending less than Rs.100/- on clothing and the remaining three families were found to spend an amount between Rs.200/- to 400/-. The clothing expenses of the individual families ranged from Rs.25/- to 333/- with an average of Rs.92/-.

It was found that the minimum expense for education was found to be Rs.25/- and the maximum was Rs.833/- with an average of Rs.184/-. Six families *viz.*, (family no. 4, 7, 9, 10, 12 and 14) had no educational expenses since they had only grownup children. Three families each were found to spend less than Rs.200/- or more than Rs.400/- per month for

educating their children as shown in Table 9. When the individual family expenditure was analysed, family no. 6 had the highest expenditure, while family no. 2 had the lowest expenditure as far as education was concerned.

When the amount spent on transportation taken into account, it ranged from Rs.25/- to 500/- with an average of Rs.246/-. It was also found that 40.00 per cent (family no. 5, 6, 9, 10, 13 and 15) were spending more than Rs.401/- per month for transportation, while 33.33 per cent (family no. 1, 2, 4, 7 and 8) were spending an amount less than Rs.100/- as shown in Table 9. Only two families (family no. 11 and 14) were found to spend an amount ranging between Rs.101/- to 200/- for transportation and the remaining two families (family no. 1 and 3) had an expense between Rs.201/- to 300/- per month. When the expenditure on transportation was analysed, family no.9 had the highest expense and the lowest expense was observed in family no.7 and 12.

The expenditure on medical care (including health checkup and purchase of medicines) ranged between Rs.35/- to Rs.1,000/- with an average of Rs.214/-. The expenditure incurred on maintenance of health showed that 6 families (family no.1, 2, 8, 9, 13 and 14) had not spent any amount for medical care during the period under report. They were depending on government dispensaries and Primary Health Centers for minor ailments that they had. About 27.00 per cent (4 families, family no.4, 6, 12 and 15) were found to spend an amount between Rs.101/- to 200/- per month and one family (family no.3) had to spend an amount less than Rs.1000/- during the month under report related to medical contingencies which had negatively affected their family budget.

When the expenditure for fuel was taken into account, the amount ranged from Rs.5/- to Rs.40/- with an average of Rs.22/- during last month.

The amount spent by 13 families for electricity bill ranged between Rs.37/- to 150/- while two families (family no.7 and 13) had no expenditure on this account, since they had no electricity connection.

Family no. 6 had the highest electricity charge during the month of survey and family no.2 had paid the lowest amount.

Of the families surveyed, 93.33 per cent had no expenditure on entertainment while family no.10 had spent less than Rs.100 for entertainment during the period under report. The expenditure incurred for religious and social functions by the 15 families ranged from Rs.150/- to Rs.475/- with an average of Rs.211/-. It was observed that 53.33 per cent i.e.8 families (family no.1, 2, 3, 5, 8, 11, 13 and 14) had an expense that ranged between Rs.101 – 200 for religious and social functions while two families (family no.4 and 7) reported that they had no such expense during the survey period. The result showed that family no.9 had spent the highest amount and the lowest amount was spent by family no.15 for religious and social functions.

Under the miscellaneous items of expenses, expenditure were incurred for purchase of cosmetics and toiletries. Data presented in Table 9, showed that all the 15 families (10.00 %) were found to spent an amount less than Rs.100/- per month on these items.

Apart from this newspaper was seen purchased by two families (family no.3 and 10) and they were found to spent an amount less than Rs.100/- per month for this purpose.

Distribution of families with respect to the monthly expenditure on conventional habits are presented in Table 10.

Table 10. Distribution of families with respect to the monthly expenditure on conventional habits

Monthly expenditure	Alcoholic drinks		Betel chewing, cigarette, beedi smoking	
	No.	Per cent	No.	Per cent
0	9	60.00	2	13.34
< 100	-	-	2	13.34
101-200	-	-	5	33.33
201-300	1	6.67	1	6.66
301-400	-	-	2	13.33
≥ 401	5	33.33	3	20.00
	15	100.00	15	100.00

It was seen that nine families (family no. 1, 3, 6, 8, 10, 12, 14 and 15) had no expenses related to drinking, while 33.33 per cent *ie.*, five families (family no. 2, 5, 7, 9 and 11) were spending an amount more than Rs.400/- on alcoholic drinks. The remaining one family (*ie.*, family no.4) had spent Rs.201/- to 300/- on this account.

Details pertaining to the expenditure related to betal/panmasala chewing, cigarette or beedi smoking, ranged from Rs.50/- to 540/- with an average of Rs.228/- per month. Majority of the families (33.33 %) were spending an amount that ranging between Rs.101/- to 200/- while family no. 2, 13 and 15 had incurred an expense of more than Rs.401/- per month for betal chewing and smoking. Only two families (family no.1 and 7), had no such conventional habits and hence they were devoid of such expenses.

Another item of expenditure that needed special mention in this survey was the amount that some of the families had to set apart for repayment of loans.

Data collected on these lines showed that 13.33 per cent (*ie.*, family no.3 and 15) had repaid an amount between Rs.101/- to 200/- during the last month, while another two families, family no. 5 and 10 had paid a sum between Rs.201/- to 300/- and one family (family no.13) had spent more than Rs.300/- for repayment of loans. However it was a relief to note that majority (66.66 %) of the families had no expenditure with respect to repayment of loans.

The consolidated expenditure on food and non-food items along with total income and expenditure by the families were analysed and the above details are presented in Table 11.

Table 11. Balance sheet based on income and expenditure (Rs.)

Family no.	Income.	Expenditure		Total expenditure	Balance
		Food items	Non food items		
1	2050	1500	1089	2584	-539
2	1050	870	2140	3010	-1960
3	2775	1800	2583	4383	-1608
4	2600	500	1057	1557	1043
5	5940	1500	1828	3328	2612
6	1050	1550	3236	4786	-1550
7	1500	930	810	1740	-240
8	1900	930	1245	2175	-275
9	8180	1500	2277	3777	4403
10	3900	735	2126	2861	1039
11	4300	1500	1670	2170	1130
12	2800	720	1153	1873	927
13	2450	1500	1664	3164	-714
14	3000	1500	965	2465	535
15	1950	900	2068	2968	-1018

The data shows that average total monthly income of these families ranged from Rs.1050/- (family no.2 and 6) to 8180/- (family no.9) while the expenditure pattern (including food and non food item) revealed that family no.6 has the highest expenditure of Rs.4786/- and lowest expenditure was for family no.4, Rs.1557/-.

While analyzing the expenditure pattern of the families, with respect to food and non-food items, it was seen that family no.3 was spending highest amount on food (Rs.1800/-) and least amount was spent by family no.4 (Rs.500/-). But for non-food items Rs.3236/- was found to be spent by family no.6 and the least amount of Rs.810/- was found to be incurred by family no.7. The consolidated family budget presented in the form of a balance sheet in Table 11, indicates a wide gap between income and expenditure of majority of the families (53.33 %) especially that of family no. 1, 2, 3, 6, 7, 8, 13 and 15, the expenditure was more than the income bringing about a negative balance in the family budget. Family no.9 seems to have a better financial status when compared to other families.

In spite of having conceivable variations in income and expenditure, one positive habit noticed among all the families surveyed was that they had savings, which ranged from Rs.100/- to 400/- per month on an average. Though 40.00 per cent were saving only Rs.100/- or below, majority had utilized their money to invest in LIC (46.00 %) while the others had small amounts deposited with post office, co-operative society, ayalkootam (13.00 % each) and under kudumbasree project (33.00 %).

Another distressing result obtained from the study was that all the families had the habit of borrowing money also. The families borrowed amounts ranging from Rs.200/- to 5,000/-, prior to the socio-economic survey. The data further revealed that 40.00 per cent (6 families) had borrowed less than Rs.1000/- while five families (33.34 %) had borrowed an amount above Rs.5000/- during the month prior to the conduct of the socio-economic survey. Being an agricultural labourer the head of the family no.12 had borrowed Rs.40,000/- for digging a well, from the bank.

Enquiry on the purpose which has led to borrowing had brought out the idea that 33.34 per cent had borrowed money for meeting food demands and for the annual maintenance of the house (changing the roofing material) and four (26.67 %) families had borrowed money to meet the expenses related to the education of their school going children. It was noticed that three families (20.00 %) had utilized the borrowed amount for celebrating marriages or for the formalities related to the death of family members. Though ten families (66.67 %) are involved in agriculture, only two (13.34 %) had borrowed money for activities related to agriculture. As far as the source of borrowing was concerned 66.67 per cent reported that they had borrowed money from neighbours while only 33.33 per cent utilized the lending services rendered by banks or cooperatives.

Most important economic problems reported by all the respondents were high price of commodities that they purchase for their daily requirements. The second serious problem faced by them was lack of permanent employment reported by 86.67 per cent followed by cost of children's education.

Though these families had economic problems, their quality of life apart from determinants such as income, education and employment is liable to be affected by their living conditions.

The subjects being landless agricultural labourers by virtue of selection possessed less than five cents of land. It was seen that they all had their own houses constructed within this area and three households had cowsheds attached to the house. The area surrounding the house was not found to be utilized for cultivation, except that two families had one coconut tree each in their premises.

Apart from the house, which is their permanent asset, the families had farm implements, too. Being agricultural labourers all households had sickles. None had ploughs or sprayers.

As assets the families surveyed possessed household goods and enumeration on consumer durables possessed by these families revealed wide variation and ten to fourteen families possessed chairs, tables and cots. It was interesting to note that 66.00 per cent of the families had television. Two families even possessed telephones, three of the electrified families had a mixer-grinder.

However, in a rural area, agriculture is always related to cultivation of crops coupled with nurturing of domestic animals. But here it was inturging to note that only four households (26.66 %) had poultry (comprising of 2 to 7 birds) and two households each had goat and cow. A matter of special mention in this context was that 40.00 per cent of the households had dogs (one each) while one had a parrot, these being pet animals.

Based on the economic survey results the house seems to be the most valuable permanent asset held by the subjects. The value of the house possessed by these families ranged from Rs.2,00,000/- to 10,000/- in the descending order.

The living space of these households ranged from 320 to 1098 square feet having rooms ranging from one to six, majority of households (53.34 %) had 3 to 4 rooms, while only one house was six roomed, and three (20.00 %) were one-room apartments. Taking into account the number of rooms and the number of persons living in the households, the per capita availability of room was calculated and data revealed that majority of the families (54.00 %) had less than one room per person.

When the physical amenities available to the households were taken into account, it was gratifying to note that 86.00 per cent of the households (13 families) had electricity and 80.00 per cent (12 families) had their own lavatory. As far as drinking water facility was concerned, only 6 (40.00 %) families had their own well and the remaining 60.00 per cent had to collect drinking water from public well or public tap provided under the rural water supplies scheme. It was further annoying to note that 40 per cent of the families had to walk 75 feet to collect water while six families (40.00 %) had to walk 150 feet and the remaining 20.00 per cent had to walk 200 feet. The time taken for collecting water varied from 15 minutes to one hour depending on the distance to be travelled and the quantity of water required.

The sanitary and hygienic conditions of the households were also taken into account. Apart from the type of the house and its nature and availability of water, the fuel used and the drainage facility were looked into to assess sanitation and hygiene prevailing in the households. The neatness and sanitation within and outside the house could be ranked as 'poor' when assessed by observation by the investigator. While none of the families had effective drainage facility, waste materials from the

farms such as combustible material of coconut tree which emits much smoke and dust was the major fuel used by five families, ten out of fifteen families were using kerosene along with biodegradable waste. It was seen that sawdust and firewood were used respectively by 26.67 and 20.00 per cent of the families surveyed.

When enquiries were made on the utilization of public facilities it was seen that all the families were utilizing the hospital facility available near by, while only 60.00 per cent utilized the school facility and the public water distribution facility. Though the major occupation of the subjects were agriculture, only 66.67 per cent utilized the facilities rendered by Krishi Bhavans. It was alarming to note that except the public distribution system, other social welfare services and prophylaxis programmes were not utilized by any of the subjects under the preview of the study. The lack of public contact as reflected from the participation of these subjects in the social activities of the locality was evident from the fact that 66.00 per cent were not at all involved in social activities. While two (13.33 %) were members of labour unions only one was a political activist. Two were members of a sports club in the area.

4.2 THE PHYSICAL QUALITY OF LIFE

From the socio-economic data the physical quality of life of the families were assessed for computing the Rural Quality Life Index (RQLI) using the indicators and scoring technique suggested by Dhanasekharan (1991). The fifteen indicators used in computing the RQLI were caste, educational level of the household head, occupational category, number of female earners, annual household income, annual per capita income, calorie intake per day per person, protein intake per day per person, annual food expenditure as percentage of income, value of clothing per person, quantity of clothing per person, annual expenditure on

Table 12. Scores for rural quality of life indicators of the families

Sl. No.	Indicators	Scores obtained by individual families														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Caste level	6	1	1	1	1	1	3	1	1	3	4	3	3	1	1
2	Educational level of the household head	4	2	3	1	1	2	3	0	1	1	0	3	2	1	1
3	Occupational category	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
4	Female earners	0	0	3	1	3	0	0	0	3	3	0	1	1	0	0
5	Annual household income	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6
6	Annual per capita income	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	Calorie intake per day per person	2	1	1	3	1	2	4	2	2	2	1	2	3	3	2
8	Protein intake per day per person	2	1	1	1	2	3	1	1	1	2	2	1	2	2	2
9	Annual food expenditure as percentage of income	0	0	1	6	6	1	1	6	6	6	6	6	2	6	6
10	Value of clothing per person	2	0	2	3	0	6	1	2	6	2	2	1	3	2	0
11	Quantity of clothing per person	1	1	1	1	2	2	1	1	2	1	1	1	1	1	1
12	Annual expenditure on clothing per person	4	3	5	5	3	6	3	4	5	4	4	3	5	4	3
13	Type of roof	3	0	6	6	6	0	0	0	6	4	6	1	0	2	2
	Type of Wall	2	2	3	3	2	2	0	2	6	2	2	2	2	2	2
	Type of Floor	2	0	3	3	1	3	0	0	3	2	3	3	0	2	2
14	Living area per person	6	4	4	6	5	6	6	5	6	5	6	5	5	6	6
15	Room per person	4	1	3	4	3	4	2	4	4	4	2	4	4	4	3
	Total scores	50	27	49	56	48	50	37	40	64	54	51	48	45	48	43

clothing per person, type of housing (roof, wall and floor) living area per person and room per person.

Though most of these indicators were collected through the socio-economic survey, details pertaining to clothing (such as quantity and value) were collected in addition for this purpose. Data related to protein and calorie intake derived from weighment survey were also utilized in the computation of RQLI.

The RQLI for each family was computed by scoring each of the indicators, by giving weightage of 6, 5, 4, 3, 2, 1 and 0.

The scores obtained for the individual indicators were summed up to get the total score for a family. The individual scores for indicators and the total score obtained by each of the families are presented in Table 12 and Fig 1.

The total scores obtained by the fifteen families ranged from 64 to 27 out of a maximum score of '90', if the quality of life was at its best using the parameters suggested by Dhanasekharan (1991).

As far as family no. 1 was concerned, it had a score of 50 out of 90. Analysis of factors which might have reduced the quality of life in the case of this family seems to be indicators 3, 4 and 15 for which zero scores were given. These factors were occupational category of head (casual employment) absence of female earners and spending more than 75 per cent or above of income on food. The factors which had positively influenced their RQLI seems to be their higher annual income (compared to others) small family size and adequate area for living per person.

Family no. 2 seems to be having the lowest rural quality of life based on the indicators. Their score was found to be 27 out of 90. They secured zero scores for their occupation, lack of female employers, poor housing conditions and annual food expenditure (greater or equal to 75.00 % of income) and low calorie and protein intake. The only advantage that they had was that, their annual income was around Rs.10500/- which has

fetches them a score of five out of six which has also contributed to a high score of six out of six for per-capita income.

When the scores of family no.3 were examined it was seen that they had just one zero attributed to their employment pattern (casual workers). They had lower scores being members of backward communities having low calorie and protein intake, with insufficient clothing and annual food expenditure being more than or equal to 70.00 per cent of income.

Family no. 4 had the second best score of 56 out of 90 though they had secured lower scores for the educational status, employment status, number of female wage earners, deficient protein intake and inadequate clothing per person. However, they seemed to have better housing condition, larger living area per person, comparatively high annual household income and lower food expenditure as percentage of income (≤ 45 per cent).

Families no.5, 12 and 14 were seen to possess a common score of 48. While family no.5 and 14 had two 'zero' scores and four 'sixes' each. Family no.12 had one 'zero' and three 'sixes'. Though all these families had lower scores with respect to protein intake, family no.12 seems to be at a greater disadvantage than family no.5 and 14. All the three families were found to have comparatively good annual and per-capita income as well as low levels of food expenditure (less than 45.00 per cent).

Family no.6 had secured a score of 50 out of 90. This quality status was found to be attributable to the availability of good quality clothing larger living area per person, higher annual household income and per capita income. The indicators, which have contributed negatively to their quality of life, were found to be their casual type of employment, absence of female workers, poor housing and high food expenditure (above 70.00 %).

With respect to scores allotted for RQLI, family no.7 seems to have lowest ranking next to family no.2, having secured a score of 37 out of 90, since they had obtained, zero scores for six parameters such as under employment, lack of female earners, and poor type of housing. However, their income seems to be above Rs.12,500/- per year and they also seem

to have adequate living area per person. Their calorie intake also seems to be above 2100 calories which has helped them to secure a score of '37'.

Family no.8 seemed to have a score of "40" which is less than 50.00 per cent of the total score. They have 'zero' scores for six indicators such as caste, education, employment, type of housing and living area per person coupled with high expenditure on food and poor protein and calorie intake.

One family that stands out from the remaining 14 families surveyed was family no. 9 having a score of "64". This score seems to be much above the scores obtained by others since the next lower score was "56" obtained by family no.4. Though from the point of education, caste, occupational category and protein and calorie intake, this family had secured lower scores of one or zero, it had good housing conditions, high income combined with lower food expenditure (below 45.00 % of income).

The third highest score of '51' was obtained by family no.11 which had three 'zero' scores with respect to indicators such as educational status, employment status and lack of female earners. At the same time, this family has had five 'sixes' indicating quality with respect to income, housing, availability of living area per person, along with low expenditure on food in comparison with income (less than 45.00 %).

Family no.13 and 15 were found to have RQLI scores of 42 and 45 respectively, both having three 'zero' scores each. Compared to family no. 15, the 13th family was found to have better clothing but had high expenditure on food. Though both had annual income above Rs.12,500/- and per-capita income above Rs.2,500/-, these households had only casual labourers, the only difference was that family no.15 belonged to scheduled caste community, which had lowered their total scores.

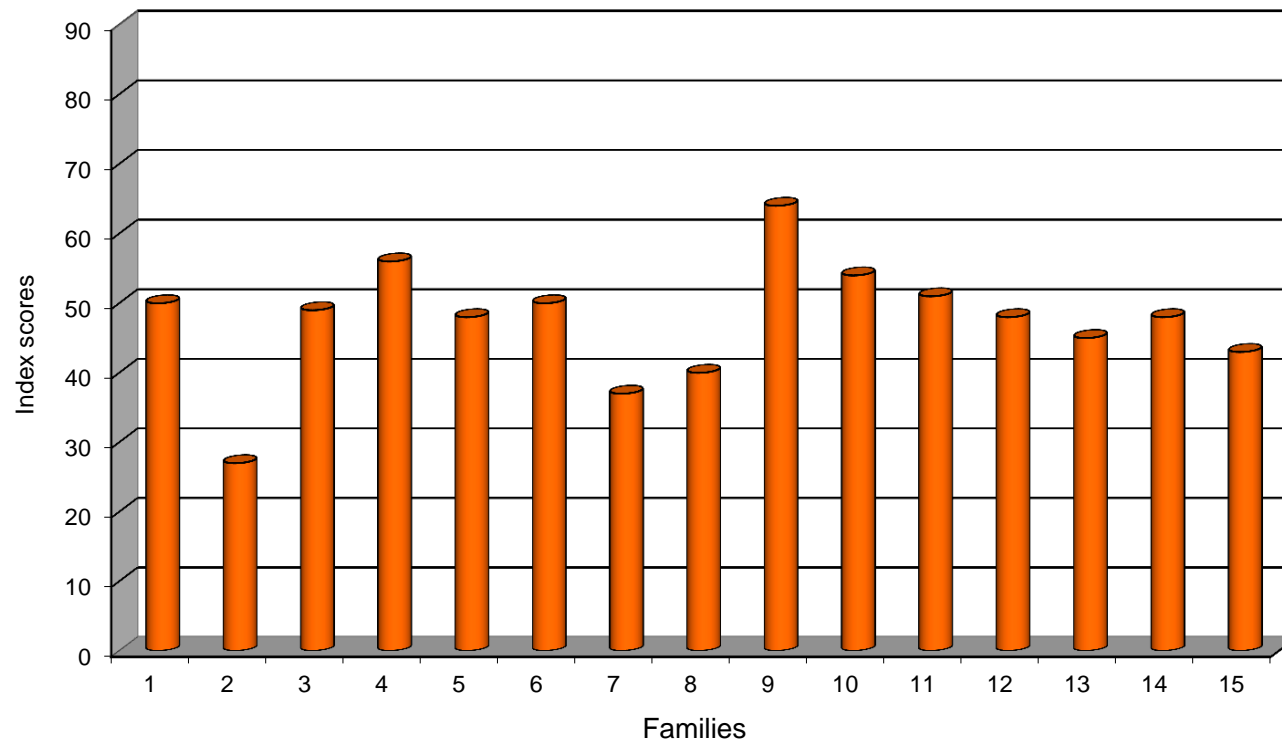


Fig. 1. RURAL QUALITY INDEX OF THE FAMILIES

Thus the RQLI scores of the families were found to range between 27 and 64. The indicators, which decided their quality of life, differed considerably between the households. The major factor which had negatively affected the quality of life of majority of the families, was their casual nature of employment. While the factors which has led to a medium level of standard of living for these families uniformly seems to be their annual household income, which was above Rs.12500/- and per capita income of Rs.2500/-. Most of the families seemed to have a score of 4 and 6 for their living area per person, which also is to be taken as an indicator of physical quality of life. Next to these, better scores ranging from three to five were seen to be allotted to expenditure on clothing per person. The other ten indicators out of the 15, seemed to vary from family to family altering the quality of life of these families.

Dhanasekharan had also suggested a classification of households in to five categories based on the total scores obtained by them as “destitutes”, “very very poor”, “very poor”, “poor” and “non poor”. If they had a score of less than 4, 4-14, 15-25, 26-39 and above 40 respectively. In accordance with this the households under focus in this study were categorized based on their RQLI scores.

Analysis of the total scores obtained revealed that 86.00 per cent of the families had a score of 40 and above and only two (*ie.*, family no.2 and 7) had a score between 26 and 39. This has led to the conclusion that except family no.2 and 7, all others can be categorized as ‘non-poor’ based on the classification suggested by Dhanasekharan (1991).

4.2.1 Principal component analysis of dimensions of rural quality life index

In the present study a further analysis of data on RQLI was undertaken to identify those factors which may have a significant influence on quality of life of the selected families. The component determining

social costs and social benefit among the various factors determining quality can be represented by means of measurements done on a number of factors. In order to identify the proportionate contribution of these factors to total variability the principal component analysis was carried out using the dimensions that determine the RQLI. By principal component analysis, it is possible to concentrate on those factors or linear combinations of the factors, which are mainly responsible for the variation between the respondents. The total variability present in the data are divided into different components (equal to the number of factors). Such that each component is a linear combination of the different factors. These combinations are called principal components. The procedure of finding these functions is by applying orthogonal transformations to the original set of variables (Hotelling, 1933). Here a multi dimensional data set is reduced to a space of low dimensions. The first linear combination obtained will have the maximum variation, the second has the next maximum variation and so on. First three components explaining about 84 per cent of variability were identified through this analysis.

Though 15 indicators suggested by Dhanasekharan (1991) were not used to determine the RQLI, for principal component analysis, only ten dimensions were selected. The five variables (dimensions) such as caste level, occupational category, quantity of clothing per person, annual household income and annual per capita income were excluded, just because there were no variability observed between the fifteen families in the scores as far as these components were concerned.

The selected dimensions were educational level of the household head (V_1), number of female earners (V_2), value of clothing per person (V_3), type of housing (V_4), living area per person (V_5), room per person (V_6), calorie intake per day per person (V_7), protein intake per day per

Table 13. Principal component analysis of rural quality of life

Sl. No.	Variable in the order of ranking	Principle components									
		1	2	3	4	5	6	7	8	9	10
1	V ₁₀	0.883	-0.203	0.169	0.125	0.005	0.017	-0.107	-0.157	0.299	-0.095
2	V ₄	0.277	0.299	-0.501	-0.181	0.614	-0.020	-0.052	0.268	-0.047	-0.311
3	V ₂	0.165	0.165	-0.624	0.350	-0.408	-0.158	-0.439	-0.084	-0.097	0.181
4	V ₆	0.128	0.229	0.151	0.522	-0.088	-0.513	-0.250	0.206	-0.494	-0.126
5	V ₅	0.067	0.088	0.277	0.009	0.494	-0.037	-0.437	-0.108	-0.384	0.561
6	V ₃	0.064	0.786	0.249	-0.118	-0.127	-0.189	-0.074	0.467	0.042	-0.156
7	V ₉	-0.002	0.395	0.052	-0.103	-0.151	0.101	-0.109	0.598	0.393	0.523
8	V ₈	-0.007	0.065	0.115	-0.117	-0.010	0.614	-0.634	-0.020	0.323	-0.292
9	V ₇	-0.029	0.034	0.355	-0.464	0.098	-0.515	-0.290	0.389	0.159	-0.346
10	V ₁	-0.300	0.048	-0.166	-0.550	0.395	0.148	0.188	-0.338	0.470	0.167

person (V_8), annual expenditure on clothing per person (v_9) and annual food expenditure as percentage of income (V_{10}).

The results of the principal component analysis based on the ten dimensions of Rural Quality of Life are presented in Table 13 and the percentage of variation and cumulative variation contributed by the dimensions of rural quality of life are presented in Table 14.

Table 14. Percentage of variation and cumulative variation contributed by the dimensions of rural quality of life

Sl. No.	Principle components	Percentage variance	Cumulative variance
1	1	44.928	44.928
2	2	26.175	71.102
3	3	13.262	84.364
4	4	5.765	90.129
5	5	4.074	94.204
6	6	2.638	96.842
7	7	1.688	98.530
8	8	1.128	99.658
9	9	0.294	99.952
10	10	0.048	100.00

Results indicated that the first linear combination of principal components contributed 45.00 per cent to the total variation, the second linear combination contributed 26.00 per cent variation and the third linear combination contributed 13.00 per cent variation. Thus the first three linear combinations of dimensions yielded 84.00 per cent of the total variation. In the first linear combination, larger magnitude of variation was contributed by dimensions such as annual food expenditure as percentage of income (V_{10}), type of housing (V_4) and number of female earners (V_2). In the second linear combination larger magnitude of variation was due to the dimensions such as value of clothing per person (V_3), annual expenditure on clothing per person (V_9) and room per person (V_6). And in the third linear combination, dimensions such as calorie intake per day per person (V_7), living area per person (V_5) and value of clothing per person (V_3) contributed larger magnitude of variation.

The above findings indicated that the dimensions such as annual food expenditure as percentage of income (V_{10}), type of housing (V_4) and number of female earners (V_2) contributed higher magnitude of variation in RQLI between the families and these factors might influence the food security of these families.

4.3 POVERTY INDEX OF FAMILIES

Srilatha and Gopinathan (1995) in their study done at Alappuzha had identified nine risk factors that may affect the welfare of the families in a community making them “at risk” of poverty. In the present study an attempt was made to identify the “at risk” families using the method suggested by the above authors. Here poverty is defined on the basis of a risk index called “poverty index” and a family is considered, as “at risk” if any four or more of the nine risk factors listed in the index scale are present.

The details pertaining to the presence or absence of different risks factors in each of the families are presented in Appendix II.

The data revealed that except one family (family no.1) all the other families had one to five risk factors. The data further revealed that family no.7 had five risk factors and four families (26.67 %) had four risk factors and one family had five risk factors. Hence these families (family nos. 4, 5, 7, 8, and 11) were found to be ‘at risk’ families (Fig.2).

The data on the prevalence of risk factors were further analysed, and the risk factors were ranked according to the extent of their prevalence and are presented in Table 15.

It can be seen from the Table 15 that 12 families (80.00 %) belonged to SC/ST community and this was the foremost risk factor affecting majority of the respondents. Lack of access to safe drinking water and presence of “an alcoholic” or “drug addict” or ‘other major crisis’ were ranked as II and III which were observed respectively among 60.00 and 40.00 per cent of the families. The next important factor indicating risk were “absence of household latrine”. “illiteracy among adults” and “living

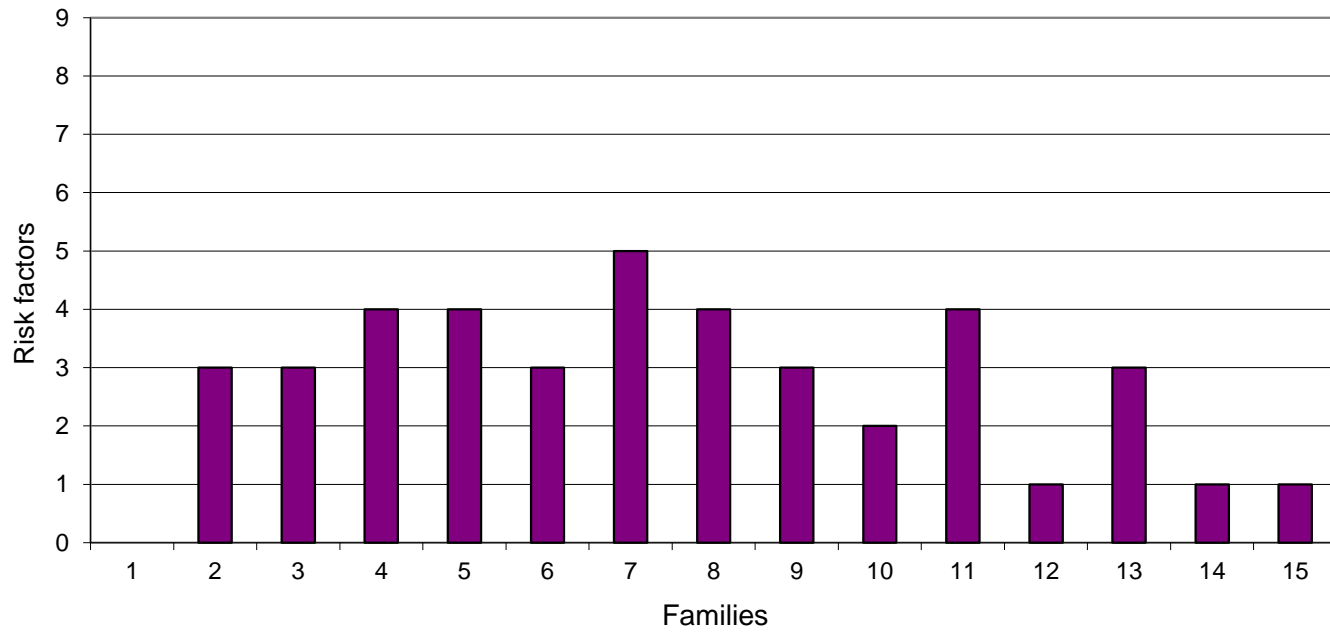


Fig. 2. NUMBER OF RISK FACTORS

Table 15. Distribution of families according to the ranking order of risk factors

Risk factors	No. of families having the risk factors	Percentage	Ranking order
1. Family belonging to SC/ST	12	80.00	I
2. Family with no access to safe drinking water	9	60.00	II
3. Presence of an alcoholic or drug addict or other major family crisis	6	40.00	III
4. Living in katcha house	5	33.33	IV
5. Family without a household latrine	5	33.33	IV
6. Family having an illiterate adult	5	33.33	IV
7. Family consuming only two or less meals a day	2	13.34	V
8. Family having children below 5 years of age	-	0	VI
9. Family with one or no adult employed	-	0	VI

in a Katcha house”. All these three risk factors were observed among 33.33 per cent of families. Another factor which was ranked Vth was “consuming only two meals a day”. This was observed only among 13.34 per cent of the families surveyed. However it was surprising to note that there were no families having “children below five years of age” or with “no adult employed”. Hence these two factors cannot be considered as risk factors as far as this group of subjects were concerned.

In general, the study indicated that the community bias (family belonging to SC/ST) lack of access to safe drinking water and presence of a family crisis were the three major risk factors observed among more than 40.00 per cent of the families surveyed.

4.4 DIETARY HABITS OF THE FAMILIES

A diet survey was conducted as a primary step to determine the household food security among selected landless agricultural labour families. In the present study the diet survey revealed information regarding the food habits of the families with respect to frequency of purchase and use of various foods, meal timings, meal pattern of the family, use of left over foods, foods given during special conditions, foods taken from outside, foods that are consumed in raw form and their frequency of use, methods employed for cooking different foods, foods preserved at home, coping techniques used to overcome food shortage, utilization of social welfare facilities related to food and opinion about their own household food security.

The results obtained from the diet survey are presented below:

All the families were found to be non-vegetarians. It was seen that family no. 1, 2, 5, 6, 13 and 15 had been practicing this dietary pattern for the last 34 years, while six families (family no. 3, 8, 9, 10, 12 and 14) had followed their dietary habit for the last 40 years. But in the case of family no.4, 7 and 11, they had followed this pattern for the last 54 years. It was interesting to note that none of the families had a different dietary pattern

earlier. Though all the subjects from these families were non-vegetarians, a special mention that needs to be made in this context is that they consumed fish in large quantities every day, other fleshy foods such as meat and egg are taken only occasionally.

Based on the above observations other details pertaining to food purchase and consumption practices of these subjects were collected and analysed.

4.4.1 Frequency of purchase of various foods

The distribution of families with respect to the frequency of purchase of various foods is presented in Table 16.

Data in Table 16, indicates that 73.33 per cent of the families purchased rice daily while four families (family no.9, 10, 12 and 14) purchased it only thrice a week. Enquiry on the purchase of other cereals like wheat and raw rice revealed that except family no. 7, all other families purchased it thrice in a week. Other items that were purchased on a daily basis were roots and tubers (93.33 %), other vegetables (93.33 %) sugar (46.67 %), oils (20.00 %) and tea (13.34 %).

Analysis done in the case of milk and milk products, revealed that milk was purchased occasionally by three families (family nos.1, 2 and 10) while family nos. 3, 6, 13, 14, and 15 were found to purchase it weekly thrice. Daily purchase pattern were observed in the case of family nos. 4, 5, 7, 8, 9, 11 and 12. While for milk products (curd), it was interesting to note that only two families (family nos. 1 and 13) purchased it daily, but family nos.7 and 12 were not in the habit of purchasing curd and the remaining 11 families purchased it once in a month or once in three months.

As far the frequency of purchase of pulses were concerned, it was interesting to note that family nos. 7, 12 and 13 never purchased pulses, while family nos. 1, 9, 10 and 15 purchased, red gram dhal, green gram dhal

Table 16. Distribution of families according to the frequency of purchase of various foods

Food stuffs	Distribution of families									
	Daily		Weekly		Monthly		Once in six months / occasionally		Never	
	No.	%	No.	%	No.	%	No.	%	No.	%
Cereals	11	73.33	4	26.66	-	-	-	-	-	-
Rice	1	6.67	13	86.66	-	-	-	-	1	6.67
Wheat					14	93.33			1	6.67
Rice raw milled										
Pulses					4	26.66	8	53.33	3	20.00
Green leafy vegetables			13.00	56.66					2	13.33
Other vegetables	14	93.33							1	6.66
Roots and tubers	14	93.33			1	6.67				
Fruits			1	6.67	14	93.33				
Nuts and oil seeds			15	100.00						
Milk	7	46.66	5	33.33			3	20.00		
Milk products	2	13.33	11	73.33					2	13.33
Oils	3	20	12	80.00						
Fats							15	100		
Sugar	7	46.66	4	26.67	4	26.67				
Jaggery							15	100		
Egg							2	13.33	13	86.66
Meat							15	100		
Fish	15	100								
Condiments			15	100						
Spices							15	100		
Health drinks									15	100
Processed foods			11	73.33			3	20.00	1	6.67
Beverages	2	13.34	13	86.66						
Miscellaneous items					14	93.33			1	6.67

and broad beans monthly thrice and another eight families purchased pulses occasionally.

When the consumption of green leafy vegetables, other vegetables and roots and tubers which can generally be categorized as vegetables results obtained gave the indication that family no.7 and 12 never purchased green leafy vegetables while other families purchased this, thrice a week. But for other vegetables, except family no. 7, all other families purchased this daily.

However family no.7 purchased roots and tubers (tapioca) monthly once, while other families purchased it daily once. The items which comes under roots and tubers that were purchased occasionally by these families were carrot and beetroot.

Fruits which comes under protective foods is seen purchased only by one family (family no.7). They purchased banana weekly once while other families purchased banana twice in a month. Another fruit which was purchased occasionally by these families were tomato, while two families (family nos.7 and 12) never purchased tomatoes.

Under beverages, coffee was not at all purchased. And similar trend was observed for synthetic fruit beverages, and other health drinks like complan, bournvita etc.

The data based on the purchase of fleshy foods revealed that fish was purchased daily, while meat was purchased occasionally by all the families. Egg was seen purchased occasionally by two families (family nos.9 and 10).

An item which was purchased on a weekly basis by all the 15 families were condiments that included red chilli, corriander, turmeric powder, cumin seeds and asafetida, while spices such as pepper, cloves, cardamom, cinnamon were purchased occasionally. Eleven families (family nos.1, 2, 3, 4, 5, 6, 9, 10, 11, 13, 15) purchased ready to eat convenient foods such as mixture, pakkavada, biscuit and chips weekly once. The selected population seems to purchase nuts (ground nut), oil

seeds (coconut and mustard) and oils (coconut oil) also on a weekly basis. They never purchased sesame and cashew nut, because they were reported to be costly items. However ghee was found to be purchased occasionally by all families, especially on days related to festive occasions.

It was an interesting observation that 14 families (93.33 %) purchased miscellaneous items like pappad and salt monthly two times. But the condition is different in the case of family no.7 in that they never purchased pappads at all.

Thus the data based on the frequency of purchase of different foods showed that the most frequently purchased items were fish followed by roots and tubers. Based on the purchase pattern, the families are liable to have a deficient availability of pulses, green leafy vegetables, fruits, fats, jaggery and nuts. It was further observed that items such as oil seeds (sesame) and ready to drink beverages, health drinks were never purchased by the families surveyed.

Since the availability and access are the two factors that are said to directly influence food security, the purchase pattern and the frequency of use of the foods purchased were considered simultaneously.

Table 17, presents the distribution of families according to the frequency of use of various foods purchased.

The net result presented in Table 17, shows that the families in general used rice, fish, sugar, oil, coconut, condiments, tea and roots and tubers in their diet daily and the frequency of use of pulses and green leafy vegetables were very low. They never used processed beverages, coffee or nuts other than coconut. The use of egg was reported by family no. 9 and 10.

From the data collected on frequency of use of foods, the most frequently used and least frequently used food stuffs were identified.

The data revealed that among the cereals, rice and wheat were the most frequently used foods and the least frequently used cereal item was

Table 17. Distribution of families according to the frequency of use of various foods

(n=15)

Food stuffs	Distribution of families											
	Daily		Once in a week		Twice in a week		Monthly		Once in six months / occasionally		Never	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Cereals												
Rice	15	100										
Wheat	1	6.67			13	86.66					1	6.67
Rice raw milled							14	93.33			1	6.67
Pulses							5	33.33	7	46.67	3	20.00
Green leafy vegetables			14	93.33							1	6.67
Other vegetables	14	93.33									1	6.67
Roots and tubers	14	93.33									1	6.67
Fruits	1	6.67							14	93.33		
Nuts and oil seeds	15	100										
Milk	10	66.66	5	33.34								
Milk products	2	13.33					11	73.33			2	13.33
Oils	15	100										
Fats									15	100		
Sugar	15	100										
Jaggery									15	100		
Egg									2	13.33	13	86.67
Meat									15	100		
Fish	15	100										
Condiments	15	100										
Spices									15	100		
Health drinks											15	100
Processed foods			14	93.33							1	6.67
Beverages (tea)	15	100										
Miscellaneous items							14	93.33			1	6.67

raw rice. When pulses were taken into account least frequently used items were red gram dhal and green gram dhal.

As far as roots and tubers, leafy vegetables and other vegetables were concerned, most frequently used item were tapioca and onion and least frequently used items were beetroot and carrot. Among leafy vegetables, amaranth and cabbage were the most frequently used items, while for other vegetables drumstick, snakegourd and brinjal were the most frequently used items by all families.

When data based on the use of milk and milk products were analysed it was clear that, cow's milk was preferred and used by (86.66 %) while two families, family no.1 and 2, used goats milk. However buttermilk and curd were the least frequently used items among the milk products.

In the case of fish the most frequently used fishes were sardine, 'anchovi' and 'tuna'. The least frequently used items were 'mussel' and 'cuttle fish'. Among meat products, chicken is the least frequently used one, while among oils, coconut oil is the most frequently used one and palm oil is least frequently used item. As far as spices and condiments were concerned chilli, coriander, turmeric, cumin seeds were the most frequently used ones. Spices such as pepper and cardamom were not used frequently.

4.4.2 Daily meal pattern of the families

The data related to the distribution of families with respect to the number of meals cooked in the household indicated that 86.67 per cent cooked meals twice a day and two families (family nos.7 and 12) cooked meals only once a day. While the cooking time of different meals of these families revealed that none had any specific time for cooking breakfast and all the families (100.00 %) had the lunch cooked between 11.30 am and 1.00 pm in the afternoon.

None of the families had any specific meal timing for breakfast, because it varied from person to person within the family. However majority reported a specific eating time for lunch as 1'0 clock and it was noticed that the dinner was served between 8.00 pm to 9.30 pm.

The daily meal pattern of the families were further studied by the dietary pattern of three consecutive days, since it would give information on the food items, commonly consumed, as well as the general dietary pattern. The regular meal pattern of the families when studied revealed that all the families were non-vegetarians and had three meals a day.

The daily meal pattern of the families indicated that all the families were taking black tea early in the morning. As far as break fast was concerned twelve families (80.00 %) were found to consume wheat preparation (wheat puttu) with black tea or tea with milk. It was observed that two families (family nos.4 and 7) were not taking breakfast, while one family (family no.12) was found to consume left over foods of the previous night as their breakfast.

The lunch pattern of the families in general indicated that rice, fish and tapioca formed the major items of lunch served during the three consecutive days of the survey. In addition to these items family no. 1 and 2 included other vegetables like drumstick, a small piece of yam, brinjal and raw banana for making 'avial' and family no.1 and 10 had 'cluster beans' pugath as part of their lunch. While family no.5, 6, 8, 11, 12 and 13 had a side dish using leafy vegetables like amaranth, drumstick or cabbage for lunch while family no.15 was seen to make use of ladies finger or green gram (whole) for preparing a side dish, to be served along with other items of lunch.

As far as 'evening tea' was concerned, 86.66 per cent were observed to take black tea along with snacks like mixture, pakkavada, banana chips or a similar fried item, while two families (family no. 2 and 10) were taking tea with milk only.



Plate 1. Raw materials used for one day meal (family no.1)



Plate 2. A typical one day meal (family no.1)

The daily dinner pattern of the family was same as that of lunch. The items cooked during lunch is used for dinner also.

During the study on meal pattern, a special attention was given to see whether the subjects included raw vegetables in their daily menu, since these items are said to contribute considerable amounts of 'antioxidants' and also, 'fibre' which in general are not considered as simple nutrients. The enquiry revealed that, vegetables and fruits were consumed in their raw form. The items that were included in the raw form were banana (ripe), cucumber, koval, lady's finger and bitter gourd. Though banana (ripe) is a common item used in the raw form and it was used only occasionally by 53.33 per cent of the families, the remaining were found to consume it once in a month. Koval was another vegetable used by all the families though the frequency of use was reported to be 'seasonal' and 'occasional'. Cucumber, bittergourd and lady's finger were used for preparing 'pachadi' that too occasionally by 46.67 per cent, 13.34 and 6.67 per cent of the families surveyed.

The above facts indicated that vegetables are rarely used in the raw form.

Enquiry made on the habit of taking food from outside which may negatively influence the family food budget and the result, revealed that only the employed adults, were in the habit of eating food from outside. However a significant gender disparity was observed among the male members as well as unemployed, in one respect, that the majority of men (29.62 %) were observed to take a cup of tea with or without a snack in the evening. Some men were also in the habit of consuming either breakfast or lunch occasionally from outside. However this was not a regular feature. It was further observed that women in general resorted to consume home made foods.

4.4.3 Special foods given during special conditions

The details regarding the special foods given to the different vulnerable groups like pregnant women, lactating mother, infants,

preschoolers, adolescence aged and during the period of illness were collected and outcome revealed that 13 families (86.67 %) were giving no special foods during pregnancy or lactation, while 13.34 per cent (family no.11 and 12) said that they would give milk in addition to the normal diet to pregnant and lactating mothers. However it was seen that milk and supplementary foods (ragi or banana porridge) were given to infants by all the families.

None of the families were found to give special foods neither to preschool children nor to the elderly.

Adolescent children were given milk and egg by eight families (53.34 %) and out of the eight families *ie.*, six families (40.00 %) were giving ‘coconut flower porridge’ and ‘neyvallikurukku’ to their children during the first menstrual period to improve their health.

4.4.4 Dietary changes during illness

Next to the vulnerable groups, the sick persons occupied an important place with the respect to their altered nutrition demands.

Enquiry on modification, in the diet due to illness, revealed that all families in general avoided solid foods during fever and diarrhoea.

Sixty per cent of the families reported that they generally do not enforce food restriction during occasions of mild illness. However 40.00 per cent informed that they would insist on reduction of sugar intake for persons suffering from diabeties and another twelve families (80.00 %) reported restricted salt intake during hypertension while three families (family no.4, 7 and 9) had no idea about the modification of diet during illness.

Data regarding food fads and faulty food beliefs when collected gave the general indication that papaya would causes abortion during pregnancy. All families reported that they take buttermilk with curry leaves or papaya to be relieved of parasitic infections.

4.4.5 Methods employed for cooking different foods

Data collected on the methods employed by the 15 families for cooking different foods, gave the indication that 'boiling' was the most frequently used method for cooking of cereals, roots and tubers other vegetables, fish and milk, while 15 families stated that they used 'absorption method' for cooking pulses. In the case of green leafy vegetables 'sauting' was the commonly used method, but 'stewing' was the method employed for cooking meat. Two families were employing 'frying' for cooking eggs, while other families (86.66 %) were not in the habit of purchasing egg. However the less frequently used method for cooking was 'sauting' and most commonly employed method was boiling.

The habit of preserving food for future were also taken into account while studying food security. The information revealed that all the families made use of 'pickling' as a means of preservation of selected foods. All families reported that they made mango pickle, while three families (20.00 %) (family nos.1, 9 and 10) were made use of lime and gooseberry for preparing pickles. It was observed that preservation technique were not employed on a large scale as a means of conserving perishable foods, available in plenty during seasons. More over none of the families had taken up preservation as an 'income generating exercise'. The quantity of items preserved were also too small that it would last only for just one week or two and it was sufficient to meet the requirement of the households for a couple of weeks.

Distribution of families with respect to the problems related to food revealed that 14 families (93.34 %) had problems related to procurement (except family no. 9) because the employed persons in these families were casual workers who are under employed. There fore the cash flow was not regular or adequate to purchase even essential food materials and hence they were forced to borrow money from neighbours to procure foods. The family members reported that they were forced to purchase small quantities since they do not have adequate storage space or containers.

The lack of storage space and containers is one of the problem that these families face, which would also effect their food security because they were constrained to buy large quantities of food stuffs when they can afford to buy or the items are available at a cheaper rate.

Another problem that is most commonly associated with food is the distribution problem. Sometimes due to limited resources, the families found it difficult to distribute the food materials equally among the family members and that the situation adversely effected the food security of this population.

Data pertaining to the use of community facilities related to food as a means to ensure food security by the families were collected. The data revealed that none of the families were utilizing the social facilities provided through Integrated Child Development Services (ICDS) and food for work programme while six families (40.00 %) family no.1, 2, 5, 6, 8 and 11 were reported that they utilized the school lunch facility, since the school going children in these families were participating in the mid-day meal programme.

Information were collected on the extent and nature of utilization of public distribution system by the families surveyed, and it was found that all the families were utilizing the public distribution system only for the purchase of Kerosene which costs Rs.5/- for half a litre and all the families were purchasing two litres of kerosene monthly.

Data when further analysed brought to the limelight that only four families (family no.9, 10, 14 and 15) purchased rice from PDS. They reported that they purchase 5 kg rice monthly from PDS at the rate of Rs.13/- per kg. Other families opined that, they do not want to purchase the rice since it is of inferior quality. They also said that they wanted the preferred quality of rice and hence were forced these families to purchase rice from open market.

The data related to coping mechanisms adopted by the families to overcome food shortages were also examined. All the families resorted to

borrow money from the neighbours with which they purchased essential food materials. Another coping mechanism used by all the 15 families surveyed were purchasing low quality food instead of superior quality (eg. 'cluster beans' instead of 'green gram') and they also opined that they substituted roots and tubers for cereals, whenever need arises.

Enquiry on the opinion of the extend of food security felt by the selected landless agricultural labourer families gave the indication that 80.00 per cent felt that they were 'food secure', while two families (13.34 %) (family no.6 and 7) were of the opinion that they were not 'food secure'.

Majority of the families (80.00 %) said that they were 'food secure' because they were able to adjust with the limited food resources available to them by equally distributing the available food among the family members. The remaining two families said that they were not 'food secure' because they find it difficult to meet the household food expenditure with the limited income they have. They try to overcome this problem by borrowing money from the neighbourhood.

4.5 FOOD PURCHASE INVENTORY

As per the definition given by the authorities working in the field of food security, it was evident that food security of households were controlled primarily by two factors: *viz.*, availability and access. Since the study aims to find out the food security enjoyed by the selected families, the food availability and access were ascertained through two methods; initially by a food purchase inventory followed by a weighment survey, which were repeated once again after a period of three months to verify the sustainability in food purchase and intake.

The details on foods purchased during the first and second food purchase inventory survey period (each of one month duration) on a daily basis were consolidated and the actual quantities of different food materials categorized in to food groups, purchased by the families were

Table 18. Mean quantities of food stuffs purchased by the families during the purchase inventory of two months along with RDA

Sl. No.	Cereals + cereal products., g		Pulses, g		Green leafy vegetables, g		Other vegetables, g		Roots and tubers, g		Fruits, g		Milk and milk products, ml		Meat + fish + egg, g		Oils + fats, g		Sugar + jaggery, g	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1	51500	57600	1725	6450	3750	7200	10830	6600	33410	5700	965	6600	6625	25500	29800	5400	1975	4650	5375	4950
2	57000	51600	1210	5400	1490	7200	9470	6000	30010	5400	1490	6600	1375	25500	28650	5400	2050	4500	2050	4800
3	64500	57300	460	7350	3485	8700	10690	6600	9955	5700	2120	5400	8625	27000	31000	5400	2750	5100	2550	4950
4	15000	32400	400	3000	660	4200	2610	3600	13100	3900	340	3600	3225	10500	8970	3600	650	2550	450	2250
5	53750	68400	260	7050	1770	10200	12320	7800	8120	7200	1290	8400	16875	3000	42326	7200	1650	5400	2950	5550
6	46250	67800	660	9300	750	8700	5040	8100	4515	6600	1045	6300	1475	33000	35250	6300	1325	6150	2550	6300
7	14750	32400	-	2000	510	4200	870	3600	2450	3900	1760	3600	10500	10500	13600	3600	700	2550	1100	2250
8	34825	57600	500	5700	510	7200	2000	6600	8540	5700	540	8250	7625	25500	25750	5400	1300	4950	1700	4950
9	77000	61200	6200	5850	1250	8400	16270	6900	24980	7200	3220	7200	15700	21000	46470	7200	2050	4650	9775	3900
10	49500	58500	1760	5400	2905	8400	4200	6600	11400	6900	2100	7200	8125	18000	31340	7200	1325	4350	4400	3750
11	55000	80400	2550	9150	3550	12150	10490	9600	18880	9000	4880	10500	14625	36000	50770	9000	2625	6750	2650	7200
12	30500	32400	-	3000	-	4200	8820	3600	12690	3900	400	3600	11250	10500	8240	3600	350	2550	600	2250
13	30412	45000	-	5100	4750	5700	6390	5100	18760	4800	-	4500	12500	18000	23110	4500	1850	3750	2050	3600
14	61500	46200	1500	4200	4260	5400	5030	5400	13320	5400	2000	5400	9250	15000	22830	5400	1450	3750	4450	3150
15	60050	56400	1350	7200	3510	8700	2450	6600	13830	5700	700	5400	7375	25500	25940	5400	1800	4950	3700	4950

1-quantity purchased (mean of two surveys)

2. requirement to provide a balanced diet for the family

presented in Appendix III and IV. The average quantities of food items purchased on a monthly basis in comparison with quantities of food groups required to provide a balance diet for each of the families are presented in Table 18.

From the above data, the average quantities of food items purchased per day by each family was computed to arrive at the availability of foods on a daily basis and such details are presented in Table 19.

The data revealed that the average quantity of cereals purchased ranged from 14750 g (family no: 7) to 77000 g (family no: 9) while the actual quantity required based on the RDA of individual members of each family, summed up together ranged from 32400 to 80400 g. This indicates wide variation between the quantity purchased and the requirement.

The adequacy of cereals when worked out indicated that it ranged from 45.00 per cent (family no. 7) to 133.00 per cent (family no. 14) as shown in Table 19.

Further analysis revealed that five families had adequate amount of cereals based on their family requirement as far as the purchase was concerned. At the same time, it was observed that two families (family no. 7 and family no. 4) were not in a position to meet even 50.00 per cent of their requirement.

Based on monthly purchase inventory a wide gulf observed between the quantity purchased and the requirement was visible for pulses. It was seen that family no. 13, 12 and 7 did not purchase pulses at all during the two months of inventory as indicated earlier in Table 18. The amount purchased varied from 260 g (family no. 5) to 2550 g (family no. 11).

The adequacy when worked out indicated that, all families except family no. 9 were able to meet their requirement only to a maximum of 35.00 per cent. Here again family nos. 3, 5 and 6 could meet only 6 to 8 per cent of their requirement.

Table 19. Percentage adequacy of families with respect to various food groups

Groups	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cereals + cereal products	89.40	110.46	112.56	46.29	78.58	68.21	45.52	60.46	125.81	84.61	68.40	94.13	67.58	133.11	104.47
Pulses	26.74	22.40	6.25	13.33	3.68	7.09	-	8.77	105.98	32.59	27.86	-	-	35.71	18.75
Leafy vegetables	52.08	20.69	40.05	15.71	17.35	8.62	12.14	7.08	14.88	34.58	29.21	-	83.33	78.88	40.34
Other vegetables	164.09	157.83	161.96	72.50	157.94	62.22	24.16	30.30	235.79	63.63	101.27	245.00	125.29	93.14	37.12
Fruits	14.62	22.57	39.25	9.40	15.35	16.58	48.88	6.54	44.72	29.16	46.47	11.11	-	37.03	12.96
Milk and milk products	25.98	5.39	31.94	30.71	56.25	4.46	100.00	29.90	74.76	45.13	40.62	107.14	69.44	61.66	28.92
Roots and tubers	586.14	555.74	174.64	335.89	112.77	68.40	62.82	149.82	346.94	165.21	209.77	325.38	390.83	246.66	242.63
Meat + Fish + Egg	551.85	530.55	574.07	249.16	587.86	559.52	377.77	476.85	645.41	435.41	564.11	228.88	513.55	422.77	480.37
Oils and Fats	42.47	45.55	53.92	25.49	30.55	21.54	27.45	26.26	44.08	30.45	38.88	13.72	49.33	38.66	36.36
Sugar and Jaggery	108.58	42.70	51.51	20.00	53.15	40.47	48.88	34.34	250.64	117.33	36.80	26.66	56.94	141.26	74.74

As far as vegetable availability was concerned inadequacy was observed in the purchase of green leafy vegetables, since majority of the families (12 families) had purchased only less than 50.00 per cent of their requirement. However, a reverse picture was seen with respect to roots and tubers, which were purchased in excess *ie.*, two to five times above the requirement by most of the families. Other vegetables which do not come under the above two groups namely the so called “other vegetables” were purchased far above the need by eight families and on the other side of the spectrum, it was seen that five families had less than 50.00 per cent.

While the adequacy of milk and milk products were considered, only two families (family no. 7 and 12) had higher percentage of adequacy. While four families (family nos. 5, 9, 13 and 14) had an adequacy ranging between 74.00 to 50.00 per cent the remaining nine families had purchased milk just sufficient to meet less than 50.00 per cent of their need.

By virtue of being non-vegetarians, it was seen that, the requirement of fleshy foods comprising of meat, fish and eggs were purchased far above the requirement, as indicated in Table 19. Further analysis revealed that, it was fish, which was purchased daily that had led to excess availability of the fleshy foods in general.

Contrary to fleshy foods, the purchase of fruits as well as oils and fats were found to be most neglected, since more than 94.00 per cent of the families had inadequate purchase of these two items as shown in Table 19.

Thus the continuum of data presented in Table 18 and 19 sequentially indicates that, if purchase pattern is taken as an indicator of food availability, which is a marker of food security, 94.00 to 100.00 per cent of the families had deficit availability of pulses, leafy vegetables, fruits and fats and oils. The other side of the picture is that 90 to 100 per cent of the families had an excess availability of roots and tubers and fleshy foods and 33.33 to 53.33 per cent families had an excess availability of cereals and cereal products along with other vegetables.

The overall picture indicates an ill-balance, as far as the monthly purchase pattern is concerned.

The purchase inventory data collected from each of the families, was used to calculate the 'per-capita availability' of different food groups per day as well as per-capita availability based on 'adult consumption unit' of different families.

4.5.1 The average daily per capita availability of different foodstuffs

The average availability of different foods per person per day during the two inventory survey periods are presented in Appendix V and VI.

The average daily per-capita availability of different foods were compared with the requirement, and the details are presented in Table 20.

The data given in Table 20 reveals that the mean per capita availability with respect to cereals ranged from 241 g (family no. 7) to 633 g (family no. 9), while the mean requirement ranged from 442 to 540 g (depending on the composition of the family). The data further revealed that while five families (family nos. 2, 3, 9, 14 and 15) had supplies more than the requirement two families (family nos. 7 and 4) were unable to meet even half of their requirement.

The per-capita requirement for pulses varied from 61 to 45 g while the intake oscillated over a wide range of 1 to 50 g. Other families were not able to meet their requirement from the quantity of pulses purchased over a month. It was also noted that 3 families (family nos. 7, 12 and 13) were not purchasing pulses at all.

The availability of leafy vegetables were found to be inadequate for all the families. However family no.13 and family no.1 had a comparatively better per-capita availability of green leafy vegetables, when compared to other families.

Though reported to be non-vegetarians, the per-capita availability of other vegetables were found to be much above the requirement for eight

Table 20. Average daily per capita availability of different food stuffs based on food inventory survey

Food stuffs	Families														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Quantity available and requirements														
CEREAL, g	421	466	528	245	352	303	241	254	633	405	300	500	332	532	491
Requirement	480	442	477	540	456	452	540	450	510	457	446	540	500	513	470
PULSES, g	8	9	3	6	1	4	-	4	50	14	13	-	-	16	11
Requirement	53	45	61	50	47	62	50	47	48	45	50	50	56	46	60
LEAFY VEGETABLES, g	30	12	28	10	11	4	-	4	6	16	19	-	51	26	28
Requirement	60	60	72	70	68	58	70	60	70	70	67	70	63	60	72
OTHER VEGETABLES, g	88	77	87	42	80	32	14	16	133	34	57	144	67	54	19
Requirement	55	50	55	60	52	54	60	55	57	55	53	60	56	60	55
ROOTS AND TUBERS, g	276	245	81	214	53	29	39	69	204	92	102	207	204	145	113
Requirement	47	45	47	65	48	44	65	47	60	57	50	65	53	60	47
FRUITS, g	7	12	16	5	8	6	28	4	26	16	26	6	-	21	5
Requirement	50	55	45	60	56	42	60	55	60	60	58	60	50	60	45
MILK AND MILK PRODUCTS, ml	54	11	70	52	110	50	172	62	128	67	79	154	136	100	60
Requirement	212	212	225	175	200	220	175	212	175	150	200	175	200	166	212
MEAT + FISH + EGG, g	244	234	254	151	277	230	223	262	192	260	333	217	252	249	203
Requirement	45	45	45	60	48	42	60	45	60	60	50	60	50	60	45
OILS AND FATS, g	15	16	22	10	10	8	11	10	16	10	14	5	20	15	14
Requirement	38	37	42	42	36	41	42	41	38	36	37	42	41	41	41
SUGAR + JAGGERY, g	43	16	20	7	19	16	17	13	79	35	14	9	22	48	30
Requirement	41	40	41	37	37	42	37	41	32	31	40	37	40	85	41

families. Except three families (family nos. 7, 8 and 15) others had moderate availability of other vegetables.

A salient difference was observed with respect to the availability of roots and tubers which seems to take up the role of a staple in the diets consumed by the selected families. Except for two families (family no. 6 and 7) all were found to purchase excess amount of roots and tubers while six families consumed three to five times more (family nos. 1, 2, 4, 9, 12 and 13) the required amount of roots.

Fruits the so called 'costly' items of the diet (when purchased from outside) was found to be one of the grossly inadequate food stuffs available to these families. The per capita availability varied from 5 g (family no.4) to 28 g (family no.7) while (family no.13) was not purchasing any fruit at all.

Milk which is found to be used only for preparation of tea or coffee and it was adequately available only to six families (family nos. 5, 7, 9, 12, 13 and 14). Gross inadequacy in milk availability was observed in two families (family no. 6 and 2). Nine families out of 15 families surveyed could not meet even 50.00 per cent of their requirement of milk based on the inventory survey data.

An item of diet which seems to be used far above the requirement was fleshy foods. The per capita availability ranged from 151 to 333 g against the requirement of 45 to 60 g. The excess availability of fleshy foods is attributed to the purchase of fish (four to six times above the quantity required for a balanced diet).

The energy suppliers of the diet namely 'fats and oils' are found to be purchased below 50.00 per cent of the requirement by all the families, while the monthly purchase of sugar was found to be adequate just for three families (family nos. 1, 9 and 10). In short inadequacy were found in majority (50.00 %) of the families surveyed.

From the data presented in Table 20, adequacy with respect to availability of foods per person per day was worked out in comparison

with the requirement to provide a balanced diet for each of the families. The variations with respect to adequacy is presented in Table 21.

When the adequacy was considered the individuals in family no. 1 had deficient supply of pulses, leafy vegetables, fruits, milk and milk products, and oils and fats by above 49.00 per cent, while for cereals the level of inadequacy was 13.00 per cent per person. These family members have an excessive availability of roots and tubers and fleshy foods much above the requirement. The availability of sugar was 5.00 and 60.00 per cent above the requirement respectively.

Data on availability of food per person in family no. 2 showed that, there is an inadequacy of pulses, leafy vegetables, fruits, milk and milk products, oils and fats and sugar by above 57.00 per cent, while the adequacy of roots and tubers and fleshy foods were high. The adequacy of cereals and other vegetables were 5.00 and 54.00 per cent above the need.

Family no. 3 had an excessive availability of fleshy foods, roots and tubers and other vegetables. When compared with requirement, the availability of cereals was just 10.00 per cent above the RDA. However, this family had a deficient availability for pulses (-94.00 %), leafy vegetables (-62.00 %), fruits (-63.00 %), milk and milk products (-69.00 %), oils and fats (-48.00 %) and sugar (-51.00 %) based on purchase inventory as shown in Table 21.

Family no.4 also had an excessive availability of root and tubers and fleshy foods, but all other food stuffs were found to be available much below the RDA with the inadequacy ranging from 30.00 to 91.00 per cent.

Family no.5 was noted to purchase deficient amounts of cereals, pulses, leafy vegetables, fruits, milk and milk products, oils and fats, sugar and jaggery to a level of 97, 85, 84, 71, 49, 45, 25 per cent inadequacy respectively. There was an excessive availability of roots and tubers and fleshy foods.

Table 21. Adequacy of families based on foods available per person per day

Food groups	Families														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Adequacy														
Cereals and cereals products,	-13	+5	+10	-55	-23	-33	-56	-41	+24	-17	-33	-8	-34	+23	+4
Pulses,	-84	-79	-94	-87	-97	-94	-100	-92	+4	-69	-74	-100	-100	-66	-82
Leafy vegetables	-49	-80	-62	-85	-84	-92	-100	-94	-92	-78	-72	-100	-19	-56	-61
Other vegetables	+60	+54	+59	-30	+54	-39	-77	-71	+131	-38	+7	+140	+18	-9	-64
Fruits	-85	-78	-63	-91	-85	-84	-52	-92	-57	-80	-56	-90	-100	-64	-88
Milk and milk products	-75	-95	-69	-71	-45	-96	-2	-71	-27	-56	-61	+5	-32	-40	-72
Fleshy foods	+442	+421	+464	+151	+478	+448	+271	+260	+554	+334	+567	+261	+404	+315	+351
Oils and fats	-60	-57	-48	-76	-71	-79	-74	-75	-57	-71	-62	-87	-52	-63	-65
Sugar and jaggery	+5	-59	-51	-81	-49	-62	-53	-67	-145	+15	-65	-74	-45	-43	-27
Roots and tubers	+475	+446	+71	+230	+10	-34	-39	+47	+240	+61	+105	+219	+283	+142	+138

Family no. 6 was found to be deficient of all food groups except fleshy foods and the level of inadequacy ranged from -33.00 per cent to -96.00 per cent.

Per capita availability similar to family no.6, was observed in family no.7 also. But the difference noticed was that they did not purchase pulses and leafy vegetables at all. The availability of milk and milk products among individuals of this family was found to be deficient only by just two per cent when compared to the requirement.

The per capita household food availability of family no.8 when examined revealed that, there is an excessive supply of roots and tubers and fleshy foods on one hand and there was gross deficiency in the availability of pulses (-92.00 %), leafy vegetables (-94.00 %), fruits (-92.00 %), other vegetables (-71.00 %), milk and milk products (-71.00 %), oils and fats (-75.00 %), sugar and jaggery (-67.00 %) and cereals (-41.00 %) while a different picture was observed in family no.9 and the results showed that there was an excessive availability of cereals, pulses, other vegetables, fleshy foods, sugar and roots and tubers. There seemed to be deficient supply of leafy vegetables (-92 %) fruits (-57 %) milk and milk products (-27 %) and oils and fats (-57 %).

Family no. 10 had an excess availability of fleshy foods, sugar and jaggery and roots and tubers when compared to requirement. A deficient supply was observed with respect to cereals, pulses, leafy vegetables, other vegetables, milk and milk products, oils and fats ranging from 17.00 to 80.00 per cent.

Similar to family no.7, family no.12, also did not purchase pulses and leafy vegetables. The availability of other vegetables (+140.00 %), milk and milk products (+5.00 %), fleshy foods (+261.00 %) and roots and tubers (+219.00 %) were in excess when compared to RDA. Their diet seemed to be deficient in fruits, oils and fats, sugar and jaggery also. As shown in the Table family no.13 had not purchased pulses and fruits. More over the purchase of cereals, leafy vegetables, milk and milk

products, oils and fats, sugar and jaggery were above 19.00 per cent but below 52.00 per cent of the requirement.

An identical pattern was observed in family no.14 and 15. As far as their purchase and adequacy were concerned these families had an excessive availability of cereals, fleshy foods and roots and tubers. There was a shortage in the supply of other food groups among the individuals in these family include ranging from -9.00 to -88.00 per cent.

The above data presented in Table 21, in general revealed that the availability of different foods, per person per day could also be taken as a criteria to assess food security. Based on this criteria none of the families could be adjudged as 'food secure'. Their nutritional security is also beyond question since the diets of all the individuals in these families were highly imbalanced, though all have an excessive availability of fleshy foods and roots and tubers.

4.5.2 Average daily availability of foods per consumption unit (CU)

The per capita availability per person per day explained above represents the average quantity of different foods available for each person in a family based on the inventory survey data. As the families differ in their composition with respect to age, activity and sex of its members, it was desirable to calculate the food availability based on 'consumption unit (CU)'. The total consumption unit of each family was computed using the method suggested by Gopalan *et al.* (1991) and the details are given in Table 22.

The data shows that the total adult consumption units varied from 2.4 to 6.1 where in the highest CU was recorded for family no. 11 and the lowest was for family no. 4, 7 and 12.

Based on the total CU the availability of different foods per CU per day for each family was worked out from the two purchase inventory data and the details are presented in Appendix VII and VIII when compared with the requirement for different foods.

Table 22. The total consumption unit of 15 families

Family No.	Family composition												Total consumption unit
	Adult				Adolescents				Children				
	Male	CU	Female	CU	Male	CU	Female	CU	Male	CU	Female	CU	
1	1	1.6	1	0.8	2	1.0,1.0							4.4
2	1	1.6	1	0.8					1	0.8	1	0.6	3.8
3	2	1.6	2	0.9,0.8									4.3
4	1	1.6	1	0.8									2.4
5	1	1.6	2	0.8,0.9							2	0.8,0.8	4.9
6	1	1.6	1	0.8	1	1.0	2	1.0,1.0					5.4
7	1	1.6	1	0.8									2.4
8	1	1.6	1	0.8					1		1	0.8	4.0
9	2	1.6	2	1.2									4.5
10	2	1.6	2	0.8,0.8									4.2
11	2	1.6	2	0.8,0.8							2	0.6,0.7	6.1
12	1	1.6	1	0.8									2.4
13	1	1.6	1	0.8	1	1.0							3.4
14	2	1.6	1	0.8									3.4
15	1	1.6	1	0.8	1	1.0	1	1.0					4.4

The average availability of different foods per consumption unit per day per family were compared with the requirement of the respective foods to provide a balanced diet for the individual families and the adequacy with respect to availability were computed and the details were presented in Table 23.

The data revealed that, while three families had an excess availability of cereals all others had no availability ranging from 37 to 95 g. Based on availability (CU) all the families had excess availability of fleshy foods and eight families had excess availability of other vegetables also. Items of most deficient supply were fats and oils and fruits (all families) pulses (all families), leafy vegetables (14 families) milk and milk products (all families) and sugar (13 families).

From the data presented in Table 23, adequacy of families based on food available per cu were calculated and the details are presented in Table 24.

The data revealed that all the families were consuming excess amount of fleshy foods. And the excess was to the tune of two to five times above the RDA. A similar situation was observed with respect to roots and tubers except for two families (family no. 6 and 7). All of them had availability of roots and tubers above the optimum level. With respect to other food materials that go in to a balanced diet, the variations oscillated over a wide range between the individual families primarily to the negative side of adequacy.

When the availability per CU for the individual families for different food groups were considered family no.1 had deficient supply of pulses, leafy vegetables, fruits, milk and milk products, oils and fats above 54.00 per cent but below 85.00 per cent. Though they had excess availability of roots and tubers and fleshy foods and there was a deficiency of cereals by -20.00 per cent and sugar by -4.00 per cent.

Table 23. Food availability per consumption unit per day

Food stuffs	Families														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Quantity available and requirement														
CEREAL, g	383	491	469	204	359	280	201	284	563	386	295	416	293	593	447
Requirement	480	442	477	540	456	452	540	480	510	487	446	540	500	513	470
PULSES, g	12	10	3	5	1	3	-	4	45	13	13	-	-	14	10
Requirement	53	45	61	50	47	62	50	47	48	45	50	50	56	46	60
LEAFY VEGETABLES, g	27	12	24	8	11	4	-	4	5	15	18	-	45	40	25
Requirement	60	60	72	70	68	58	70	60	70	70	67	70	63	60	72
OTHER VEGETABLES, g	80	81	77	35	82	30	11	16	118	32	56	120	1	48	18
Requirement	55	50	55	60	52	54	60	55	57	55	53	60	56	60	55
ROOTS AND TUBERS, g	248	258	72	178	54	26	33	69	151	88	101	173	180	128	102
Requirement	47	45	47	65	48	44	65	47	60	57	50	65	53	60	47
FRUITS, g	7	12	14	24	8	6	23	4	23	15	26	5	-	18	5
Requirement	50	55	45	60	56	42	60	55	60	60	58	60	50	60	45
MILK AND MILK PRODUCTS, ml	49	11	62	43	112	8	143	62	114	64	78	153	120	88	54
Requirement	212	212	225	175	200	220	175	212	175	150	200	125	200	166	212
MEAT + FISH + EGG, g	222	247	225	125	253	213	186	210	348	247	322	150	222	219	202
Requirement	45	45	45	60	48	42	60	45	60	60	50	60	50	60	45
OILS AND FATS, g	14	17	20	8	10	8	9	10	14	10	13	4	17	13	12
Requirement	38	37	42	42	36	41	42	41	38	36	37	42	41	41	41
SUGAR + JAGGERY, g	39	17	18	6	19	15	14	13	70	34	13	8	19	42	27
Requirement	41	40	41	37	37	42	37	41	32	31	40	37	40	85	41

Family no. 2 had deficient availability of leafy vegetables (-80.00 %) fruits (-77.00 %) pulses, (-78.00 %), milk and milk products (-95.00 %), oils (-54.00 %), sugar (-57.00 %) which indicate a dietary inadequacy.

Though, family no.3 had purchased excess amounts of leafy vegetables, other vegetables, roots and tubers and fleshy foods in excess of their requirement, their diets were grossly lacking in pulses, fruits, sugar and fats and oils to a level of 95.00, 67.00, 56.00 and 53.00 per cent respectively.

A deplorable inadequate situation with reference to all foods except roots and tubers and fleshy foods was seen in family no. 4, where the level of inadequacy ranged from 62.00 to 90.00 per cent for most of the foods. Another specific feature of this family was that it had a deficient intake of other vegetables too. It was of concern to understand that, with respect to the staple food namely cereals 62.00 per cent inadequacy was noticed. Pulses and milk and milk products were found to be inadequate to an extent of -75.00 to -90.00 per cent.

The situation of family no. 5 revealed that the diet were lacking in all food items except other vegetables, roots and tubers and fleshy foods and the diet seems to be most inadequate in pulses, leafy vegetables, fruits, cereals, oils and fats and sugar and jaggery to an extent of 21.00 to 96.00 per cent.

Pulses, leafy vegetables and milk and milk products were found to be inadequate to an extent of 93.00 to 96.00 per cent with respect to family no. 6 while that of fruits and oils were adequate only to a level of 20.00 and 24.00 per cent adequacy, while the inadequacy of cereals to this family was only 37.00 per cent.

Family no. 7 was noted to be one having a deficient supply of all food materials except fish. They had no supply of pulses and leafy vegetables and the inadequacy of other vegetables and oils ranged from 78.00 to 81.00 per cent. Their diet would be insufficient in calories

mainly because; it was deficient in cereals by 63.00 per cent and sugar by 61.00 per cent and roots and tubers by 25.00 per cent.

Family no.8 seems to be another household having gross inadequacy with respect to pulses (-91.00 %) leafy vegetables (-94.00 %), fruit (-92.00 %) milk and milk products (-71.00 %), Oils (-75%), Jaggery (-67.00 %) and cereals (-40.00 %). However, this family was seen to balance the inadequacy of the aforesaid food materials by an excess purchase of roots and tubers (+547.00 %) and fish (+368.00 %).

The food availability profile of family no. 9 seems to be inadequate with respect to three items namely leafy vegetables (-93.00 %), fats (-63.00 %) and fruits (-62.00 %), though they were in the habit of purchasing excess quantities of fleshy foods, roots and tubers and other vegetables.

Another family that has inadequacies ranging from 21.00 to 79.00 per cent with respect to most of the essential food groups including cereals (21.00 %) was family no.10 though they too had reported, the purchase of excess quantities of roots and tubers and fish.

Somewhat similar situation was also observed in family no.11 though it had purchased very low levels of green leafy vegetables. The cereal availability of this family was inadequate upto -34.00 per cent and the average inadequacy seemed to be doubled with deficient purchase of oils and fats, sugar and jaggery to a tune of 64.00 to 66.00 per cent. However this family seemed to have the highest CU availability of fleshy foods, which requires a special mention.

Family no.12 was found to make no use of pulses and leafy vegetables and their intake of fruits, fats and sugar were adequate only to an extent of less than 20.00 per cent, though they do have excess amounts of other vegetables, roots and tubers and fleshy foods.

Family no.13 presents a situation where the supply of cereals are deficient by -42.00 per cent while pulses and fruits do not find a place in their dietaries. However, they seemed to purchase an excess amounts of

Table 24. Adequacy of families based on food available per CU

Food groups	Families														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Adequacy														
Cereals and cereals products	-20	+11	-2	-62	-21	-37	-63	-40	+10	-21	-34	-23	-42	+15	-5
Pulses	-77	-78	-95	-90	-96	-93	-100	-91	-8	-71	-74	-100	-100	-70	-84
Leafy vegetables	-54	-80	+233	-88	-83	-93	-100	-94	-93	-79	-98	-100	-28	-32	-65
Other vegetables	+46	+63	+40	-42	+57	-45	-81	-71	+105	-42	+5	+100	+8	-20	-68
Roots and tubers	+444	+474	+51	+174	+12	-44	-25	+547	+202	+54	+102	+166	+239	+113	+116
Fruits	-85	-77	-67	-60	-85	-85	-61	-92	-62	-74	-56	-91	-100	-69	-89
Milk and milk products	-77	-95	-73	-75	-44	-96	-18	-71	-35	-58	-61	-13	-40	-47	-75
Fleshy foods	+393	+450	+402	+109	+490	+408	+210	+368	+451	+311	+545	+201	+344	+266	+350
Oils and fats	-63	-54	-53	-80	-71	-81	-78	-75	-63	-72	-64	-89	-58	-67	-69
Sugar and jaggery	-4	-57	-56	-84	-48	-64	-61	-67	+118	+9	-66	-79	-52	-50	-34

roots and tubers and fleshy foods. The availability of energy to these families will also be lesser since there is a deficiency of fats and oils, sugar and jaggery in their diet coupled with that of cereals.

Following the similar consumption pattern of other neighbourhood families. Family no. 14 and 15 had an excess availability of roots and tubers and fish. All other foods are of short supply in both these families. However, when compared to family no.15, family no.14 had an adequate supply of cereals.

The above data presented in Table 24, in general revealed that the availability of different foods based on CU. If availability is to be taken as a criteria for food security, none of the families could be adjudged as 'food secure' based on the above criteria. Their nutritional security is also beyond question, since all have diets, which were highly imbalanced.

4.6 MONTHLY FOOD EXPENDITURE PATTERN OF THE FAMILIES

From the food purchase inventory data, an effort was made to identify the expenditure incurred by the families on food. The total food expenditure was collected by summing up the cost for purchase of different food materials, recorded in the food inventory survey conducted twice and the average values for each family are presented in Table 25. The data indicates that the total food expenditure varied from Rs.714.00/- for (family no.4) to Rs.2247.00/- (family no.9) as an average expenditure in a month.

When the mean expenditure for different food groups were analysed individually, it was seen that maximum amount is spent for purchase of cereals (Rs.499.00/-) followed by fleshy foods (Rs.207.00/-). The lowest mean expenditure were recorded for leafy vegetables (Rs.10/-) processed foods (Rs.18/-), fruits (Rs. 18/-) and pulses (Rs. 24/-).

Next to cereals and fish, a considerable amount seemed to be paid for milk (Rs.140/-) followed by spices and condiments. For purchase of other vegetables and roots and tubers, the average amount spend seems to

Table 25. Monthly food expenditure pattern of the families

Family No.	Expenditure, Rs.													
	Cereals	Pulses	Leafy vegetables	Other vegetables	Roots and tubers	Fruits	Milk and milk products	Meat + fish + egg	Oils and Fats	Sugar and Jaggery	Spices and condiments	Processed foods	Miscellaneous items	Total Expenditure, Rs.
1	701	47	12	79	218	20	104	290	119	85	112	26	108	1921
2	515	37	9	114	186	17	20	262	74	44	41	24	53	1396
3	435	10	19	135	72	14	113	170	148	53	108	31	102	1410
4	256	25	6	25	69	6	52	110	33	20	54	22	36	714
5	536	30	8	158	52	22	214	250	88	72	164	36	114	1744
6	900	12	10	77	34	10	15	223	37	52	82	12	58	1522
7	182	-	18	75	12	9	169	153	33	73	67	-	16	857
8	385	4	13	20	47	5	91	127	55	36	90	-	48	921
9	534	54	13	144	159	34	200	362	166	226	137	51	167	2247
10	582	40	8	35	55	26	184	108	81	66	34	18	50	1287
11	514	35	4	125	135	27	191	327	35	60	173	-	206	1832
12	389	-	-	70	85	6	138	175	16	32	66	-	28	1005
13	421	-	12	68	124	-	168	213	80	44	160	12	74	1376
14	463	34	8	57	82	23	170	126	79	80	200	-	16	1338
15	681	33	11	154	96	11	271	220	96	54	70	50	108	1855
Mean	499	24	10	89	95	18	140	207	76	66	103	18	78	1428

be Rs.89/- and 95/- respectively and that for fat and sugar it was Rs.76/- and 66/- respectively.

When the individual family expenditure for different food groups were analysed it was seen that the amount spent in a month on an average ranged from Rs.900.00/- for (family no. 6) to Rs.256.00/- (family no. 4).

It was also observed that four families (family nos.9, 10, 14 and 15) were purchasing cereals from ration shops as well as from near by grossery shops and their expenditure on cereals were not found to be lower when compared to others, since it was Rs.534/-, Rs.582/- and Rs.463/- and Rs.681/- respectively. The amount spent on pulses was found to be negligible since it varied from Rs.4/- (family no. 8) to Rs.54/- (family no.9) and three families had no expenditure on this account (Family nos. 7, 12 and 13).

The cost of purchase of leafy vegetables was also poor ranging from Rs.4/- (family no.11) to Rs.19/- (family no. 7). It was also seen that, family no. 9 and family no.5 were spent Rs.144/- and Rs.158/- in the purchase of other vegetables.

The expenditure on roots and tubers varied widely from Rs.218/- (family no.1) and Rs.12/- (family no.7).

Next to cereals, considerable amount of money seems to be spend on fleshy foods and the expenditure ranging between Rs.110/- (family no.4) to Rs.362/- per month (family no.9).

It may be of special interest to note that only ten families had an expenditure on processed foods and this expenditure seemed to be negligible ranging from Rs.12/- to 50/-.

The Table 25, gives an overall picture that these families food budget was primarily controlled by the purchase of cereals followed by fish, which were the primary items of their basic diet followed by spices and condiments which are essential adjuvants of a low cost Kerala diet.

Table 26. Actual food intake and percentage adequacy of families with respect to various food groups

Food stuffs	Family numbers														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Quantity														
CEREAL, g	1301	1188	1147	552	1565	2099	644	1130	1416	1395	1795	803	1086	1211	1496
Requirement	1920	1720	1910	1980	2280	2260	1980	1920	2940	1950	2680	1980	1500	1540	1880
Percentage adequacy	67	69	60	51	68	92	59	58	69	71	66	74	72	78	79
PULSES, g	-	37	18	-	-	-	-	-	-	39	-	29	-	87	75
Requirement	215	180	245	100	235	310	100	190	195	180	305	100	170	140	240
Percentage adequacy	-	20	7	-	-	-	-	-	-	22	-	29	-	62	31
LEAFY VEGETABLES, g	-	-	-	-	100	230	-	70	240	90	40	-	160	-	240
Requirement	240	240	290	140	340	290	140	240	280	280	405	140	190	180	290
Percentage adequacy	-	-	-	-	29	79	-	29	85	32	9	-	84	-	83
OTHER VEGETABLES, g	310	446	-	-	66	-	-	-	83	57	82	137	92	13	240
Requirement	220	200	220	120	260	270	120	220	230	220	320	120	170	180	220
Percentage adequacy	141	213	-	-	25	-	-	-	36	25	25	114	54	7	109
ROOT AND TUBERS, g	104	1013	791	971	895	360	120	224	915	966	887	833	559	752	152
Requirement	190	180	190	130	240	220	130	190	240	230	300	130	160	180	190
Percentage adequacy	548	563	416	747	373	63	92	117	388	420	295	641	349	418	80
FRUITS, g	125	-	59	35	101	-	110	-	76	97	198	34	100	90	70
Requirement	200	220	180	120	280	210	120	275	240	240	350	120	150	180	180
Percentage adequacy	62	-	33	29	36	-	91	-	32	40	56	28	66	50	38
MILK AND MILK PRODUCTS, ml	291	240	152	170	240	240	180	195	247	240	310	120	261	160	226
Requirement	850	850	900	350	1000	11000	350	850	700	600	1200	350	600	500	850
Percentage adequacy	34	28	16	48	24	21	51	22	34	40	25	34	43	32	26
MEAT + FISH + EGG, g	35	20	18	27	28	66	17	13	24	22	11	15	33	32	41
Requirement	155	150	170	85	180	205	85	165	155	145	225	85	125	125	165
Percentage adequacy	22	13	10	32	15	32	20	7	15	15	4	18	26	25	25
OILS AND FATS, g	50	42	65	30	60	62	30	52	60	50	80	27	45	45	55
Requirement	165	160	165	75	185	210	75	165	130	125	240	75	120	105	165
Percentage adequacy	30	21	39	40	32	29	40	31	46	40	33	36	37	42	33
SUGAR + JAGGERY, g	168	162	181	248	253	337	99	285	205	210	263	253	115	349	275
Requirement	180	180	180	120	240	210	120	180	240	240	300	120	150	180	180
Percentage adequacy	93	101	109	207	105	160	82	158	85	87	87	211	77	194	153

4.7 ACTUAL FOOD CONSUMPTION PATTERN OF THE FAMILIES (WEIGHMENT SURVEY)

The food purchase inventory data provides indications pertaining to availability of food to individual families. Several studies had indicated that availability of food alone does not guarantee access to food by individual families. Moreover, this does not give any indication to the access and availability of different foods to the individual members who constitute isolated families. Further, it gives no indication to the utilization of food in terms of nutrients which are the constituents of food. With this background, weighment survey was conducted in each of the families in two spells with the gap of three months. The weighment was conducted on a random day of a week. A single day weighment was resorted to since the subjects were all from a rural area and were also from low socio-economic families where the probability of diet being monotonous is high. During the weighment survey the meal, the menu, the raw items that had gone in to the meal, cooked weight of individual items of the menu, the quantity of each item actually consumed by individual members of the family were recorded.

From the above data the actual consumption (mean of two weighment surveys) of different foods (categorized in to food groups) by the 15 families were worked out and the details are presented in Table 26. This Table 26, gives the availability and access of different foods to individual families which is a mean of weighment survey conducted twice. This data was further utilized to test the adequacy of individual items that constitute a balanced diet. By comparing the actual intake with the quantity of foods required providing a balanced diet for the selected family. This data provides information not only on availability and access to food to the family members but also helps to assess the nutritional status. The distribution of families based on percentage adequacy are presented in Table 27.

The data presented in Table 27, indicates that the mean cereal consumption was sufficient to meet only 50.00 to 80.00 per cent of the requirement of fourteen families. Only family no. 6 had an adequacy of around 93.00 per cent. This reflects the fact that cereal inadequacy is an inherent phenomenon in all these families.

Table 27. Distribution of families with respect to percentage adequacy of different food groups

Food groups	Percentage of adequacy and number of families					
	≥ 100	75-99	74-50	< 50	0	Total
Cereals, g	-	3	12	-	-	15
Pulses, g	-	-	1	5	9	15
Leafy vegetables, g	-	4	-	3	8	15
Other vegetables, g	4	-	1	5	5	15
Fruits, g	-	1	4	7	3	15
Milk and milk products, ml	-	-	1	14	-	15
Roots and tubers, g	12	2	1	-	-	15
Meat + fish + egg, g	9	6	-	-	-	15
Oils and fats, g	-	-	-	15	-	15
Sugar and jaggery, g	-	-	-	15	-	15

Another calorie supplier, which also supplies protein in Indian dietaries in general are pulses. Though all the families except three had stated, that they too purchase pulses as far as the use was concern. It was seen that nine families (60.00 %) have not utilized pulses at all, as clarified by the weighment survey conducted at two periods. The adequacy of intake of pulses was below 50.00 per cent for five families (33.33 %). It was family no.14 which was able to meet at least 62.00 per cent of the requirement.

Similar to pulses, the milk consumption was also found to be below 50.00 per cent for most of the families 93.33 per cent out of 15. The consumption of milk varied from 120 ml to 291 ml against a requirement ranging from 350 ml to 11000 ml depending upon the composition of the families. However, this defect seemed to be compensated when the

consumption of fleshy foods was taken into account. It was noticed that, 9 families (60.00 %) were consuming fish much above the requirement (101.00 to 211.00 %), while the remaining families had an adequacy in the range of 77.00 to 87.00 per cent (family nos. 7, 9, 10, 11 and 13), family no.1 had a somewhat sufficient intake which would take care of nearly 94.00 per cent of the requirement.

The consumption of vegetables and fruits which are known to be 'protective foods' were evaluated and it was noted that except one family (family no.7) all others had inadequate intake of fruits though two families were having an adequacy of 62.00 to 66.00 per cent (family nos. 1 and 13). Others had less than 38.00 per cent and three families (family no.2, 6 and 8) had no intake of fruits at all.

It is a well known "dictum" that the inadequacy imparted by fruits, can be set right by inclusion of vegetables especially the green leafy vegetables, by balancing the nutrient contribution. However, in the present study, it was seen that eight families did not include green leafy vegetables while three families (family nos. 5, 8 and 10) had an intake below 32.00 per cent. However, another four families had an adequate intake ranging from 79.00 to 85.00 per cent. It was further observed that family no.9 had an intake less than 10.00 per cent of the requirement.

Other vegetables are also acclaimed to supply regulatory nutrients and here again it was seen that a group of five households did not include other vegetables at all in their diet during the diet survey periods, though during the purchase inventory period, all the subjects had stated that they would purchase other vegetables regularly. Thus it was estimated that eight (53.33 %) of the families had more than enough supply of other vegetables for their family requirement and another three families had less than 50.00 per cent of the requirement. It was also seen that only four families had adequate amount of other vegetables.

Among the vegetables, the roots and tubers were considered as major energy suppliers and it was seen that twelve families had an intake

of roots and tubers much above the actual requirement and this could be the reason for consuming lesser amounts of fats, oils and sugar which is seen to be met to a level below 50.00 per cent in all the families.

In short, the weighment survey results indicated inadequacy with respect to cereals, pulses, leafy vegetables, other vegetables, fruits, milk and milk products, fats and oils and sugar and in most cases, the requirements were met only to an extent of 50.00 per cent or less. Another disturbing factor is that the dietary imbalance is marked by excess consumption of fish and roots and tubers.

4.8 ACTUAL NUTRIENT INTAKE OF FAMILIES (WEIGHMENT SURVEY)

From the food consumption data presented in Table 26, the mean availability of ten different nutrients to the families and its members were calculated and the data is presented in Table 28.

To find out whether, the nutrients consumed are sufficient to meet the requirement of the family members belonging to individual families and the intake was compared with RDA and the distribution of families according to percentage adequacy of different nutrients are presented in Fig. 3.

The data as shown in Table 28, with reference to major nutrients indicates that there exists an imbalance. It was surprising to note that, protein seems to be the major nutrient of the diet consumed in excess of the requirement by 11 families (73.33 %) and the percentage adequacy varied from 2.00 to 32.00 per cent above the RDA. However, the remaining families too had a comparatively adequate diet ranging from 94.00 to 98.00 per cent. Hence the protein intake in general be stated as adequate for all families.

The calorie intake was found to range from 4833 (family no.12) to 11151 kcal (family no.6). When compared with requirement, it was seen that five families had an adequate intake of calories while the remaining

Table 28. Actual nutrient intake of families in comparison with requirement

Nutrients	Families														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Quantities														
PROTEIN, g	240.76	202.92	239.98	108.11	306.80	359.86	105.94	237.12	274.19	238.47	351.05	103.70	170.02	150.14	325.35
Requirement	234	194	220	110	270	350	110	260	220	230	292	110	189	170	246
CALORIE, kcal	8734.17	7648.80	7513.95	5724.25	10323.90	11151.47	5633.37	8519.22	9130.50	9340.45	10982.94	4833.75	7730.31	7474.12	9231.84
Requirement	9550	8750	9450	5000	11000	11500	5000	9000	9800	9150	13525	5000	7600	7350	9450
FAT, g	33.77	45.89	28.32	8.02	40.62	62.61	27.63	41.21	37.81	50.81	74.91	23.18	39.29	33.86	38.82
Requirement	60	65	60	30	75	75	30	60	60	60	95	30	45	45	60
CALCIUM, mg	1024.25	337.31	706.12	380.55	1294.22	1468.39	502.09	1070.26	1103.72	1269.65	1148.53	697.55	959.48	1072.57	1759.54
Requirement	2000	1800	1660	800	2400	2600	800	2000	1600	1600	2400	800	1300	1200	1900
IRON, mg	91.24	72.52	67.54	37.00	101.84	130.53	38.98	72.15	93.00	96.59	126.02	40.82	76.53	83.63	104.37
Requirement	129	104	116	58	128	157	58	114	116	114	159	58	108	86	131
RETINOL, ug	667.97	1208.41	920.88	338.85	917.60	543.26	397.26	584.75	900.76	441.29	821.08	1152.60	669.46	772.71	1186.16
Requirement	2400	2200	2400	1200	3000	3000	1200	2400	2400	2400	3400	1200	1800	1800	2400
B-CAROTENE, ug	1025.17	2825.11	1295.79	474.71	1417.00	107.81	416.78	1007.81	1400.74	3541.52	2557.83	1477.57	1385.69	1188.13	1836.14
Requirement	9600	8800	9600	4800	12000	12000	4800	9600	9600	9600	13600	4800	7200	7200	9600
THIAMINE, mg	3.8	4.09	2.85	1.76	4.68	5.00	1.68	3.06	4.67	3.77	5.07	2.05	3.79	3.80	4.44
Requirement	4	4	4	3	5	5	2	4	5	4	6	3	2	3	4
RIBOFLAVIN, mg	2.17	2.13	1.18	0.97	2.44	2.98	0.75	1.94	2.10	2.06	2.51	1.54	2.02	2.12	2.23
Requirement	5	5	5	3	6	6	3	5	5	5	8	3	4	4	5
NIACIN, mg	52.98	46.67	50.06	30.47	69.21	72.16	25.73	52.14	60.39	58.83	68.01	28.83	46.08	39.22	42.52
Requirement	63	58	63	33	71	77	33	61	65	61	90	33	50	49	63
ASCORBIC ACID, mg	143.55	97.36	102.11	12.42	154.90	96.39	59.01	76.47	67.74	67.29	122.38	60.35	80.26	77.82	97.00
Requirement	160	160	160	80	200	200	80	160	160	160	240	80	120	120	160

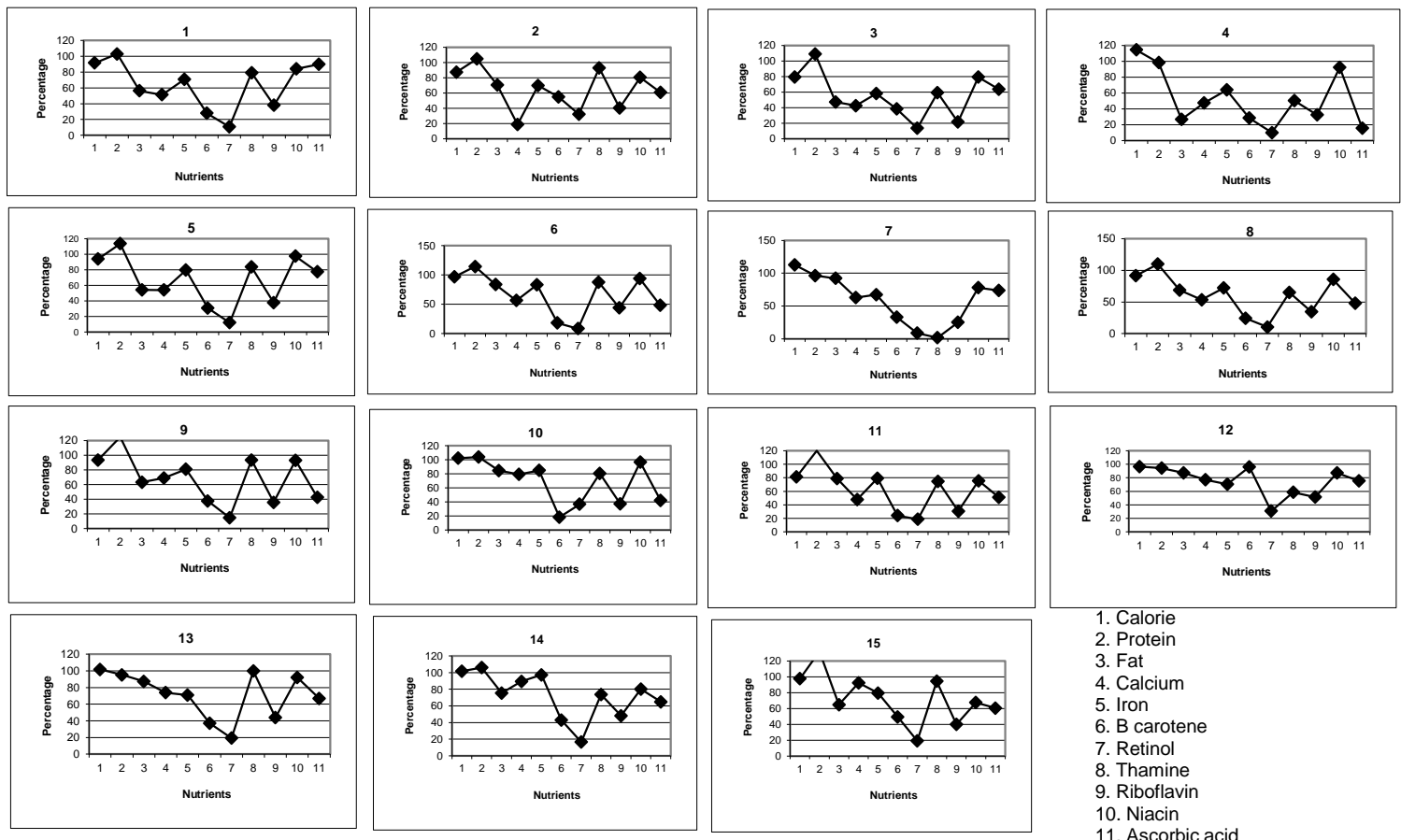


Fig. 3. PERCENTAGE ADEQUACY OF DIFFERENT NUTRIENTS

eight families had it between 91.00 to 97.00 per cent and two families between 81.00 (family no. 11) to 87.00 per cent (family no. 2).

Among the major nutrients, fats seems to be the most inadequate element, since none of the families had adequate intake. While two families had 47.00 per cent (family no. 3) and 26.00 per cent (family no. 4), the others had an adequacy ranging from 54.00 to 87.00 per cent and only one family had an adequacy of 92.00 per cent (family no. 7).

Among the minerals, the adequacy of calcium and iron intake were worked out and it was seen that none had adequate intake of these two minerals. While family no.2 had an adequacy of calcium by 18.00 per cent, family no.15 had 92.00 per cent adequacy. Majority among the remaining families had more than 50.00 per cent of the requirement met.

A somewhat similar picture was seen with respect to iron. However, none of the families had too low an intake, but all the families had an adequacy ranging in the order of 58.00 to 83.00 per cent; while one family (family no.13) was able to meet 97.00 per cent of its requirement.

Apart from iron, another micronutrient whose intake was taken into account was vitamin A along with that of beta-carotene. The data gave an alarming picture of inadequacy except in family no.12. While this family had an intake of 96.00 per cent. The others had it in the range of 18.00 to 54.00 per cent.

The vitamin A counterpart of vegetables, *ie.*, beta-carotene, intake seems to be highly deplorable since thirteen families had an adequacy in the range of 8.00 to 19.00 per cent, while two families (family no. 10 and 12) had 36.00 and 30.00 per cent respectively of their requirement, despite the claim that, they take excess amounts of roots and tubers and other vegetables.

Table 28, also gives the consumption pattern of water soluble vitamins like thiamine, riboflavin, niacin and ascorbic acid. Out of these, riboflavin seems to be the most inadequate B-complex vitamin whose requirement is met, to a level of 21.00 per cent but below 50.00 per cent for all the families.

As far as thiamine intake was concerned, four families had an intake above 90.00 per cent, while one family (family no. 7) had too low an intake (1 %). The others had an intake above 50.00 per cent but below 80.00 per cent.

Though the intake of fruits and green leafy vegetables were found to be highly inadequate as shown in Table 28. The vitamin C adequacy of five families were found to be below 50.00 per cent, while two families had it above 89.00 per cent. Only one family (family no. 4) had the lowest consumption of vitamin C (15 %), while seven of the families had adequacy in the range of 50.00 to 75.00 per cent.

In a nutshell, it is seen that eleven families (73.33 %) and five families (33.33 %) had an excessive intake of protein and calories respectively. About half of the subjects had an intake of different nutrients except β -carotene and vitamin C in the range of 75.00 to 99.00 per cent. Majority of the families *ie.*, 13 (86.66 %) had significantly deficient intake of two nutrients like retinol/ β -carotene and riboflavin than other nutrients as shown in Fig.3.

However, there is a general belief that the quality of diet can be judged from the protein and calorie adequacy. Therefore an attempt was made to find out the protein and calorie adequacy of the diets consumed by the 15 families and the data is presented in Table 29.

Table 29. Mean protein and calorie adequacy of the families

Family No.	Protein (mean intake) g	RDA, g	Deviation, g	Percentage Adequacy	Energy (mean intake), kcal	RDA, kcal	Deviation, kcal	Percentage adequacy
1	61.30	58	+2.8	104.78	2211.05	2387	-176.45	92.60
2	50.63	48	+2.13	104.39	1993.76	2187	-193.74	91.14
3	58.00	55	+3.0	105.45	1699.93	2137	-437.57	79.52
4	54.26	55	-0.74	98.65	2570.89	2500	+70.89	102.83
5	66.14	54	+12.14	122.48	1977.87	2020	-42.13	97.91
6	24.48	63	+11.48	118.22	2189.89	2300	-110.11	95.21
7	53.33	55	-1.67	96.96	2811.63	2500	+311.63	112.46
8	57.76	54	+3.76	106.96	2154.76	2325	-170.24	92.67
9	57.68	55	+2.68	104.87	2195.90	2225	-29.10	98.69
10	60.72	55	+5.72	110.40	2351.38	2287	+64.38	102.81
11	61.84	47	+14.84	131.57	1818.89	2200	-381.11	82.67
12	52.00	55	-3.0	94.54	2327.50	2500	+172.50	93.10
13	62.54	63	-0.46	99.26	2521.13	2533	-11.87	99.53
14	69.26	56	+13.26	123.67	2594.59	2450	+144.59	105.90
15	64.33	61	+3.33	105.45	2267.82	2362	-94.18	96.01

The average protein as well as calorie intake of the 15 families in comparison with RDA are presented in Table 29. The data shows that the protein intake of 11 families were found to be above 100.00 per cent, while the remaining four families (26.66 %) had an adequacy above 94.00 per cent but below 100.00 per cent.

The average calorie intake revealed that only 4 families (family nos. 4, 7, 10 and 14) had calorie adequacy (above 102.00 %) while in other nine families had an intake was adequate to meet 91.00 per cent of the requirement and the remaining two families (family no. 3 and 11) had an adequacy of 82.67 and 79.52 per cent respectively.

Table 30. Distribution of households according to protein calorie adequacy status (n=15)

Protein (p)/calorie (c) adequacy	No. of families	Percentage
Range		
P+C+	2	13.34
P+C-	11	73.33
C+P-	4	26.66
P-C-	1	6.67

Distribution of households according to protein calorie adequacy status as shown in Table 30 reveals that only 13.34 per cent (family no. 10 and 14) had protein and calorie adequacy, while eleven families (73.33 %) had protein adequacy alone and 26.66 per cent had calorie adequacy only. The remaining one family (family no.13) had neither protein adequacy nor calorie adequacy.

4.9 ACTUAL FOOD INTAKE OF FAMILY MEMBERS

The data presented in Table 26, 27 and 28, gives a composite picture with respect to food and nutrient consumption of families. As families are made of individuals, it is essential to workout the adequacy with respect to food and nutrient intake of individual members. As reported earlier, the 15 families selected are not identical with respect to their composition. Hence it was desirable to see whether the diets consumed by the families were adequate to provide the required food materials and nutrients for the members of the family when categorized in to various groups based on physiological status, age, sex and physical activity, the factors that, which control the requirement of foods and nutrients.

As explained in the demographic profile of the families (Table 3), the fifteen families comprising of fifty six members of whom 16 (28.57 %) were heavy workers. The data also revealed that their age varied from 23 to 60 years.

The mean food intake (actual) of individual heavy workers were calculated and were compared with their RDA and the extent of adequacy based on food intake and RDA are presented in Table 31. Distribution of heavy workers according to the adequacy of intake of different foods that constitute a balanced diet are presented in Table 32.

4.9.1 Actual food intake of heavy workers

As far as the cereal consumption was concerned, it varied from 643 g to 307 g against the RDA of 670 g and the adequacy ranged from 45.00

Table 31. Mean food intake of heavy workers with respect to various food groups (n=16)

Family No.	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
Index No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Food stuffs	**Food intake, g															
CEREAL, g	418.18	535.20	355.58	447.42	494.71	643.5	372.24	364.07	384.44	403.44	426.29	427.40	446.88	307.53	555.03	434.44
Requirement	670	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	52.41	79.88	50.08	66.77	73.83	96.06	55.55	54.33	57.37	60.28	63.62	63.79	66.69	45.90	82.84	64.84
PULSES, g	-	22.88	10.25	-	-	-	-	-	-	13.33	-	-	16.76	-	10.00	35.92
Requirement	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	-	38.13	7.08	-	-	-	-	-	-	22.21	-	-	27.93	-	16.66	-59.86
LEAFY VEGETABLES, g	-	-	-	-	50	50	-	28	40	10.16	-	-	-	50	-	50
Requirement	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	-	-	-	-	125	125	-	70	40	25.4	-	-	-	125	-	125
OTHER VEGETABLES, g	94.14	25.90	-	-	33.00	-	-	-	25.91	-	19.48	21.28	78.23	41.72	5.00	90.00
Requirement	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	117.67	32.37	-	-	41.25	-	-	-	32.38	-	14.46	26.60	97.79	52.15	6.25	112.50
ROOT AND TUBERS, g	374.63	704.50	321.59	549.36	380.07	10.76	60.00	95.72	371.82	322.88	225.50	225.60	558.48	316.27	294.47	74.77
Requirement	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	468.28	880.62	401.98	686.70	475.08	13.45	75.00	119.65	464.77	403.60	281.87	282.00	698.10	395.33	368.08	93.46
FRUITS, g	35.81	-	40.34	20.66	30.00	-	110	-	23.46	25.17	14.54	22.50	-	60	30	30
Requirement	60.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	59.68	-	67.23	34.43	50.00	-	183.33	-	39.10	41.95	24.23	37.50	-	100	50	50
MILK AND MILK PRODUCTS, ml	80	60	30	120	55	50	80	5.12	60	60	40	40	60	80	40	50
Requirement	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	32	24	12	48	22	20	32	17.87	24	24	16	16	24	32	16	24
MEAT + FISH + EGG, g	52.06	56.25	45.85	141.65	90.71	95.38	38.83	94.81	59.23	61.07	60.60	60.15	174.15	36.69	130.72	81.57
Requirement	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	86.86	93.75	76.41	236.08	151.18	158.96	69.71	158.01	98.71	101.78	101.00	100.25	290.25	61.15	217.86	135.95
OILS AND FATS, g	11.12	9.97	3.32	5.80	1.40	20.00	12.00	5.12	6.53	6.33	3.07	3.00	10.68	16.21	8.04	13.50
Requirement	65.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	17.18	15.33	5.10	8.92	2.15	30.76	18.46	17.87	10.04	9.73	4.72	4.61	16.43	24.93	12.36	20.76
SUGAR + JAGGERY, g	15.00	12.5	15	15	12.5	15	15	12.5	15	15	15	15	15	15	10	15
Requirement	55.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percentage adequacy	27.27	22.72	27.27	27.27	22.72	27.27	27.27	22.72	27.27	27.27	27.27	27.27	27.27	27.27	18.18	27.27

** Mean of two weighment surveys

*(Source:ICMR, 1981)

to 82.00 per cent. As far as the adequacy was concerned, none had an adequate cereal intake. Though one person belonging to family no.6 had 96.00 per cent of the requirement met from their diet, majority of the subjects 12 (80.00 %) were able to meet the requirement for cereals below 75.00 per cent and above 50.00 per cent. One candidate (index no.14) from family no.13, was able to meet only 45.00 per cent of his cereal requirement.

As far as pulses are concerned 37.50 per cent were found to consume pulses and the quantity ranged from 10 g to 35 g against the RDA of 60 g. Here again half of those who were consuming pulses had less than 25.00 per cent of the RDA.

When the intake of green leafy vegetables were taken in to account, only seven (43.75 %) had used green leafy vegetables. Among them for had an intake of ten per cent above RDA and they belonged to family nos.5, 6, 13 and 15.

The consumption pattern of other vegetables indicated that, all except six had taken other vegetables, the quantity of which ranged from 19 g to 94 g. The data also revealed the fact that only two members had an adequate intake, while half were consuming less than 52.00 per cent of the requirement.

The roots and tubers were found to be consumed much above the requirement by 13 (81.00 %) of the subjects. Only three members with index no. 6, 7 and 16 had an intake of 13.45, 75.00 and 93.46 per cent respectively.

As far as fruits were concerned, except four others had an intake ranging from 24 to 183 g against the requirement of 60 g. While one person had an adequate intake (person no.14), the member from family no.7 had nearly double the requirement.

Milk and milk products seems to be one of the most inadequate item consumed by the individual members, since 12 members (75.00 %) out of 16 were found to consume less than 25.00 per cent of the

requirement and the remaining four seems to consume an amount ranging from 80 to 120 ml on the other hand, while the fleshy foods comprising mainly of fish and it was found to be consumed in excess of requirement by 10 (62.50 %) out of 16 subjects. While four were able to meet the requirement just above 75.00 per cent, while two (12.50 %) had an adequacy just above 50.00 per cent.

The diet consumed by this group were identified to be deficient both in the intake of fats and oils as well as sugar. The adequacy was found to be met below 30.00 per cent as far as these items were concerned.

Table 32. Distribution of heavy workers based on the adequacy with respect to various food groups

Nutrients	Percentage of adequacy						Total
	≥ 100	75-99	50-74	25-49	< 25	0	
Cereals + cereal products, g	-	3	12	1	-	-	16
Pulses, g	-	-	1	2	3	10	16
Green leafy vegetables, g	4	-	1	2	-	9	16
Other vegetables, g	2	1	1	4	-	8	16
Roots and tubers, g	13	2	-	-	1	-	16
Fruits, g	2	-	5	4	1	4	16
Milk and milk products, ml	-	-	-	4	12	-	16
Fats and oils, g	-	-	-	1	15	-	16
Sugar and jaggery, g	-	-	-	12	4	-	16
Milk + fish + egg, g	10	4	2	-	-	-	16

The data presented in Table 32, gives a general picture that the diet consumed by these heavy workers were ill balanced which are liable to be deficient in calories and also be deficient in vitamins and minerals in the case of atleast half of the population surveyed.

4.9.2 Actual food intake of adult males and females doing moderate activity

Next category selected was the moderate adults doing moderate activity who were few in number, comprising of one male and three females. The male was from family no.9 and females were from family

Table 33. Mean food intake of adult males and females doing moderate activity

Family No.		9			3		5		9	
Index No.		17			18		19		20	
	**Food intake, g									
Food groups	RDA	Moderate adult male, n=1			RDA*	Moderate adult females, n=3				
		Food intake	Percentage adequacy	Food intake		Percentage adequacy	Food intake	Percentage adequacy	Food intake	Percentage adequacy
CEREAL + CEREAL PRODUCTS, g	475	437.45	-8	350	275.76	-28	233.30	-34	349.86	-1
<i>Percentage adequacy</i>		92.09			72.56		66.65		99.96	
PULSES, g	65	-	0	55	-	-	-	-	-	-
<i>Percentage adequacy</i>		-			-		-		-	
GREEN LEAFY VEGETABLES, g	125	80.00	-36	125	-	-	-	-	80.00	-36
<i>Percentage adequacy</i>		64.00			-		-		64.00	
OTHER VEGETABLES, g	75	24.55	-68	75	-	-	13.30	-83	16.35	-79
<i>Percentage adequacy</i>		32.73			-		17.73		21.80	
ROOTS AND TUBERS, g	100	250.56	150	75	107.50	258	165.28	120	165.12	120
<i>Percentage adequacy</i>		250.56			358.33		220.37		220.16	
FRUITS, g	30	23.75	-21	30	4.13	-87	5.00	84	13.00	-57
<i>Percentage adequacy</i>		79.16			13.76		16.66		43.33	
MILK AND MILK PRODUCTS, ml	100	60.00	-40	100	30.75	-88	50.00	-50	61.25	-39
<i>Percentage adequacy</i>		60.00			12.30		50.00		61.25	
FATS AND OILS, g	40	8.05	-80	40	5.38	-87	3.72	-91	5.48	-87
<i>Percentage adequacy</i>		21.12			13.45		9.30		13.70	
SUGAR AND JAGGERY, g	40	15.00	-63	30	15.00	-67	12.50	-59	15.00	-50
<i>Percentage adequacy</i>		37.50			33.33		41.66		50.00	
MEAT + FISH + EGG, g	60	64.84	8	60	47.40	-21	35.31	42	44.28	-27
<i>Percentage adequacy</i>		108.06			79.00		58.85		73.80	

**mean of two months

*(Source:ICMR, 1968)

nos.3, 5 and 9 respectively. The mean food intake of the above workers are presented in comparison with RDA along with adequacy in Table 33.

As far as the adult male was concerned, his food intake was found to be deficient in all food materials except roots and tubers, which he was found to consume much above the RDA. The deficiency in fats and oils, sugar, other vegetables and green leafy vegetables were found to be 80.00, 63.00, 68.00 and 36.00 per cent respectively. While he was found to consume fish, eight per cent above the requirement, while the cereal consumption was eight per cent less than the requirement.

In the 15 families surveyed, there were three female workers who were doing moderate activity and their diet seemed to be devoid of pulses and highly deficient in fruits, fats and oils. Out of the three only one had adequate intake of cereals; the other two had an intake to meet only 66.00 to 72.00 per cent. However this seems to be compensated by the excess intake of roots and tubers in all the three cases.

Milk was another item of deficiency found in the diet of lady from family no.3 with (index no.18) had very low intake of milk less than 12 per cent of requirement. Though pulses are not seen to be included in the diets of these women, their intake of fish ranged from 58.00 to 79.00 per cent as far as adequacy was concerned. Hence the diet may also be deficient in protein. There are chances for the two women (index no. 18 and 19, family nos.3 and 5) were found to develop vitamin deficiency especially of (B-complex), since their intake of green leafy vegetables and fruits are far from satisfactory.

Among the three, subject with index no.18 seems to have a better food intake when compared to the other two.

4.9.3 Actual food intake of sedentary adult females

As depicted in Table 34, there were 17 females who could be categorized as females doing 'sedentary activity'. Each of the families except family no.10 and 11 had one female sedentary worker. While

Table 34. Food intake of sedentary females with respect to various food groups

(n=17)

Family No.		1	2	3	4	5	6	7	8	9	10	10	11	11	12	13	14	15
Index No.		21	22	23	24	25	20	27	28	29	30	31	32	33	34	35	36	37
Food groups	RDA	**Food intake, g																
CEREAL + CEREAL PRODUCTS, g	300.00	318.05	291.59	229.25	210.53	354.75	240.84	272.24	265.41	244.85	308.30	308.30	306.19	303.59	356.76	218.43	343.36	366.05
<i>Percentage adequacy</i>		106.00	97.79	76.41	70.17	118.25	80.28	90.74	88.47	81.61	102.76	102.76	102.76	101.19	118.92	72.81	81.12	122.01
PULSES, g	45	-	9.31	6.06	-	-	-	-	-	-	17.77	-	-	-	13.23	-	-	13.04
<i>Percentage adequacy</i>		-	20.68	13.46	-	-	-	-	-	-	39.48	-	-	-	29.40	-	-	28.97
GREEN LEAFY VEGETABLES, g	125	-	-	-	-	50.00	50.00	-	14.00	40.00	-	80.00	-	40.00	-	20.00	-	65.12
<i>Percentage adequacy</i>		-	-	-	-	40.00	40.00	-	11.20	32.00	-	64.00	-	32.00	-	16.00	-	52.09
OTHER VEGETABLES, g	75.00	81.22	214.49	-	-	20.00	-	-	-	40.17	-	-	13.32	9.32	59.13	22.26	7.14	60.00
<i>Percentage adequacy</i>		108.29	285.98	-	-	26.66	-	-	-	54.89	-	-	17.76	12.42	78.84	29.68	9.52	80.00
ROOTS AND TUBERS, g	50	233.33	200.04	143.85	421.92	176.70	116.15	60.27	102.44	128.19	180.26	180.81	159.22	161.73	274.88	107.88	238.67	49.63
<i>Percentage adequacy</i>		666.66	400.08	287.70	843.90	353.40	232.30	125.50	204.88	256.88	360.52	26.62	318.44	323.46	549.76	275.76	477.34	99.26
FRUITS, g	30.00	30.00	-	8.27	14.44	30.00	-	-	-	16.65	13.35	13.56	68.18	34.21	34.00	30.00	30.00	30.00
<i>Percentage adequacy</i>		100.00	-	27.56	48.13	100.00	-	-	-	55.50	44.50	45.20	227.76	114.03	113.33	100.00	100.00	100.00
MILK AND MILK PRODUCTS, ml	100	80.00	60.00	30.00	50.00	50.00	50.00	100.00	30.00	60.00	60.00	60.00	60.00	60.00	60.00	40.00	40.00	60.00
<i>Percentage adequacy</i>		80.00	60.00	30.00	50.00	50.00	50.00	100.00	30.00	60.00	60.00	60.00	60.00	60.00	60.00	40.00	40.00	60.00
FATS AND OILS, g	35.00	10.81	6.12	2.73	22.02	3.64	7.00	5.00	3.50	4.55	4.44	6.14	1.40	2.49	5.23	8.93	5.91	9.11
<i>Percentage adequacy</i>		30.88	17.48	7.80	62.91	10.40	20.00	14.28	10.00	13.00	12.68	17.54	4.00	7.11	14.94	25.51	16.88	23.02
SUGAR AND JAGGERY, g	30	15	10	15	15	15	10	15	15	15	12.50	12.50	15	15	12.50	10	15	10
<i>Percentage adequacy</i>		50.00	33.33	50	50	50	33.33	50.00	50.00	50.00	41.66	41.66	50.00	50.00	41.6	33.33	50.00	33.33
MEAT + FISH + EGG, g	60	45.74	36.46	34.97	106.90	57.60	63.06	60.44	97.65	37.29	41.55	42.77	32.85	38.40	79.53	39.39	9.14	64.41
<i>Percentage adequacy</i>		76.23	60.76	116.58	178.16	96.00	105.73	100.73	162.75	62.15	138.50	142.56	54.75	64.00	132.55	65.65	151.90	107.35

**Mean of two weighment surveys *(Source:ICMR, 1968)

family no.10 and 11 had two such members. The Table as such gives a view that the consumption of pulses, leafy vegetables, other vegetables are meagre in majority of the subjects surveyed.

It was seen that pulses were included only by five (29.41 %) and the adequacy of consumption varied from 13.46 to 39.48 per cent.

Coming to the leafy vegetables, it was noticed that 9 (52.94 %) out of 17 did not include green leafy vegetables in their diet at all and among those who were consuming it, the level of intake was not in an acceptable range. The subject with index no.28 was found to consume very low amount of this foodstuff. While in others, the adequacy of others was found ranged from 16.00 to 64.00 per cent.

Other vegetables though reported to be purchased in considerable amounts by all the families, seven (41.76 %) out of 17 had not included such vegetables in their diet during the weighment survey periods. The intake of this again varied on a wide scale, where two (11.76 %) of the subjects had an adequate consumption while three (17.64 %) had an intake below 20.00 per cent of the requirement.

Among the vegetables, roots and tubers seems to be one component which is consumed lavishly by all members of the family especially the women folk. This fact endorsed by the data presented in Table 34, indicates that all the subjects were consuming roots far above the requirement.

Though fruits are not consumed by subjects with (index nos. 20, 22, 27 and 28). Out of the 14 persons, eight persons had adequate intake of fruits while the remaining had an intake that could meet 25.00 to 75.00 per cent of their requirement.

Similar to the consumption of pulses was the intake of milk which is another source of protein. Here, majority of the subjects were able to meet only 40.00 to 60.00 per cent of their requirement. However, the subjects seems to meet the requirement of protein through a surplus intake of fleshy foods (especially fish) as shown in Table 34, 58.82 per cent had

surplus intake of this, while 29.41 per cent had an intake ranging between 50.00 to 75.00 per cent.

The diet of these women in general were found to be deficient in fats and oils, sugar and jaggery while the consequent deficit of energy seems to be made up by slightly higher intake of cereals and cereals products by 47.05 per cent of the subjects. However, the intake of the remaining were not found to be satisfactory since they were able to meet only 70.00 to 80.00 per cent of their requirement for cereals.

The overall picture showed that based on the consumption of a balanced diet, the food intake of the selected sedentary females seems to be inadequate in pulses, leafy vegetables, other vegetables, milk and milk products, sugar and jaggery and oils and fats. However, the intake of fish, cereals, roots and tubers were found to be satisfactory.

Table 35. Distribution of sedentary females with respect to various food groups

Nutrients	Percentage of adequacy						Total
	≥ 100	75-99	50-74	25-49	< 25	0	
Cereals + cereal products	8	7	2	-	-	-	17
Pulses	-	-	-	3	2	12	17
Green leafy vegetables	-	-	2	4	2	9	17
Other vegetables	2	2	1	2	3	7	17
Roots and tubers	16	1	-	-	-	-	17
Fruits	8	-	1	3	1	4	17
Milk and milk products	1	1	11	4	-	-	17
Fats and oils	-	-	1	3	13	-	17
Sugar and jaggery	-	-	10	7	-	-	17
Milk + fish + egg	10	2	5	-	-	-	17

4.9.4 Actual food intake of sedentary adult males

Among the subjects, included under the weighment survey there were only three male members who were sedentary workers and they were from family nos.3, 10 and 14.

The data presented in Table 36, revealed that none of the subjects consumed were green leafy vegetables and except one (index no.40) the diet was devoid of other vegetables too. Even this person seemed to consume negligible amounts of other vegetables.

Table 36. Mean food intake of adult males doing sedentary activity with respect to various food groups (n=3)

Family No.		3	10	14	Percentage adequacy		
Index No.		38	39	40			
Food groups	RDA	**Food intake, g					
CEREAL + CEREAL PRODUCTS, g	400	306.51	375.05	412.75	-24	-	3
<i>Percentage adequacy</i>		76.62	93.76	103.18			
PULSES, g	55	1.75	8.88	77.33	-97	-84	40
<i>Percentage adequacy</i>		3.1	16.14	140.60			
GREEN LEAFY VEGETABLES, g	100	-	-	-	-	-	-
<i>Percentage adequacy</i>		-	-	-			
OTHER VEGETABLES, g	75	-	-	1.76	-	-	-
<i>Percentage adequacy</i>		-	-	2.34			
ROOTS AND TUBERS, g	75	218.75	282.58	219.34	191	276	192
<i>Percentage adequacy</i>		291.66	376.77	292.45			
FRUITS, g	30	11.14	45.60	30.00	-63	52	0
<i>Percentage adequacy</i>		37.13	152.00	100.00			
MILK AND MILK PRODUCTS, ml	100	61.64	60.00	80.00	-39	-40	-20
<i>Percentage adequacy</i>		61.64	60.00	80.00			
FATS AND OILS, g	40	7.00	7.34	18.15	-83	-82	-55
<i>Percentage adequacy</i>		17.50	18.35	45.37			
SUGAR AND JAGGERY, g	30	20.00	10.00	20.00	-34	-67	34
<i>Percentage adequacy</i>		66.66	33.33	66.66			
MEAT + FISH + EGG, g	60	53.06	64.90	127.50	-12	8	112
<i>Percentage adequacy</i>		88.13	108.13	212.50			

**Mean of two weighment surveys

*(Source:ICMR, 1968)

Similar to the cases discussed earlier, the subjects too had an excess intake of roots and tubers, while they consumed negligible amounts of fats and oils and sugar and jaggery.

Among the three subjects, seems to have a better diet than the other two, because this subject was found to consume cereals, pulses, fruits, roots and tubers and fish above the requirement. However, his intake of leafy vegetables and other vegetables were most inadequate, while the deficiency in the consumption of milk, fats, sugar and jaggery were significant.

The poor dietary pattern of subject no.1 and two belonging to (family nos.3 and 10) were more or less similar. Their diet consisted of an excessive amounts of roots while it was deficient in all other items. The degree of deficiency varied from 12.00 to 97.00 per cent for various items; The most deficient items being pulses, fats and oils, leafy vegetables and other vegetables subject with index no.39 was slightly in a better position since he had sufficient intake of fruits and fleshy foods when compared to subject no.1.

Thus the diet of this group were also seems to be ill balanced.

Scanning through the figures presented in Table 3, it was seen that out of the total population under study 28.57 per cent were children between the age of 4 – 16 who could be classified as adolescence, of school going children and adolescents. As the requirements varies with age as well as sex, the food intake and adequacy of the diet consumed by these groups were considered separately and the data are presented in Table 37 to 40.

4.9.5 Actual food intake of adolescent children

The actual consumption of the two adolescent children (1 male and 1 female) belonging to family no.13 and 15 were given along with RDA in Table 37, indicated that the boy had deficient intake of leafy vegetables (-70.00 %) other vegetables (-60.00 %), fruits (-9.00 %), milk and milk

Table 37. Mean food intake of adolescent male and female children (16 to 18 years) with respect to different food groups
(n=2)

Family No.		13		15
Index No.		41		42
Food groups	**Food intake, g			
	RDA*	Adolescent male, (n=1)	RDA	Adolescent female (n=1)
CEREAL + CEREAL PRODUCTS, g	450	429.33	350	329.33
<i>Percentage adequacy</i>		95.40		94.09
PULSES, g	50	-	50	10.43
<i>Percentage adequacy</i>		-		20.86
GREEN LEAFY VEGETABLES, g	100	30	150	67.74
<i>Percentage adequacy</i>		30		45.16
OTHER VEGETABLES, g	87	34.40	75	30.00
<i>Percentage adequacy</i>		39.54		40.00
ROOTS AND TUBERS, g	87	165.12	75	20.21
<i>Percentage adequacy</i>		189.79		26.94
FRUITS, g	30	27.35	30	10.00
<i>Percentage adequacy</i>		91.16		33.33
MILK AND MILK PRODUCTS, ml	150	120	150	45.00
<i>Percentage adequacy</i>		80		30.00
FATS AND OILS, g	50	11.76	40	10.24
<i>Percentage adequacy</i>		23.52		25.60
SUGAR AND JAGGERY, g	40	15	30	15.00
<i>Percentage adequacy</i>		37.50		50.00
MEAT + FISH + EGG, g	30	34.66	30	74.37
<i>Percentage adequacy</i>		115.53		247.90

**Mean of two weighment surveys

*(Source:ICMR, 1968)

products (-20.00 %) oils and fats (-77.00 %) and sugar and jaggery (-63.00 %), while the consumption of roots and tubers and fleshy foods were in surplus, the cereal and fruit consumption were some what adequate (90.00 to 95.00 %).

Coming to the female child, the diet was deficient in pulses (-80.00 %), leafy vegetable (-55.00 %), other vegetables (-60.00 %), roots and tubers (-74.00 %), fruits (-67.00 %), sugar and jaggery (-50.00 %), oils and fats (-75.00 %), milk and milk products (-70.00 %).

In the light of the data, it can be concluded that the female child consumes a poorer diet when compared to the male child.

4.9.6 Actual food intake of 13-15 year old male and female children

The family composition analysis revealed the presence of five children (3 boys and 2 girls) in the age group of 13-15 years. The three boys belonged to family nos.1, 6 and 15 while the two girls belonged to family no.6. Their consumption pattern are presented in Table 38.

The consumption of the boys varied between the three. The child with index no.43 had not consumed either pulse nor green leafy vegetables and his diet was deficient in milk and milk products, oils and sugar. His diet was found to meet only 71.00 per cent of requirement for cereals but on the other hand, he was found to consume excess amounts of roots and tubers, and fish while he had adequate intake of fruits.

For boy from family no.6 the consumption of cereals, roots and tubers, and fleshy foods were high and it was noted that his diet was devoid of pulses and fruits. The consumption of green leafy vegetables, milk and milk products, fats and oils, sugar and jaggery ranged from 39.00 to 60.00 per cent.

As far as the boy with index no.45 was concerned, there was a deficient intake of roots and tubers and fats and oils while there was an excess intake of fleshy foods. The cereal adequacy and adequacy of other vegetables was above 80.00 per cent. All the other essential items of a balanced diet were lacking in his diet.

Table 38. Mean food intake of 13-15 years old male and female children with respect to various food groups

		(n=5)					
Family No.		1	6	15		6	6
Index No.		43	44	45		46	47
Food groups	**Food intake, g						
	RDA*	Male children, n=3			RDA*	Female Children, n=2	
CEREAL + CEREAL PRODUCTS, g	430	308.95	479.02	366.77	430	331.14	404.69
<i>Percentage adequacy</i>		71.62	111.39	85.29		77.00	93.95
PULSES, g	50	-	-	15.65	50	-	-
<i>Percentage adequacy</i>		-	-	31.30		-	-
GREEN LEAFY VEGETABLES, g	100	-	60	58.06	100	30	40
<i>Percentage adequacy</i>		-	60.00	58.06		30	40
OTHER VEGETABLES, g	75	72.35	-	60	75	-	-
<i>Percentage adequacy</i>		96.46	-	80		-	-
ROOTS AND TUBERS, g	75	166.60	86.34	7.58	75	69.32	77.88
<i>Percentage adequacy</i>		221.33	115.12	10.10		92.42	103.84
FRUITS, g	30	30	-	-	30	-	-
<i>Percentage adequacy</i>		100	-	-		-	-
MILK AND MILK PRODUCTS, ml	150	61	60.00	61	150	40.00	40
<i>Percentage adequacy</i>		40.66	40.66	40.66		26.66	26.66
FATS AND OILS, g	40	6.89	15.69	8.58	40	11.50	12.50
<i>Percentage adequacy</i>		17.22	39.22	21.45		28.75	31.25
SUGAR AND JAGGERY, g	30	10.00	15	15	30	10.00	12.50
<i>Percentage adequacy</i>		33.33	50	50		33.33	41.66
MEAT + FISH + EGG, g	30	38.26	139.59	55.44	30	53.29	56.23
<i>Percentage adequacy</i>		127.53	465.30	184.80		177.63	187.43

**Mean of two weighthment surveys

*(Source:ICMR, 1968)

There was a considerable variation in the consumption of cereals as well as roots and tubers, between these children. However the diet of these three children were found to be inadequate for all foods except roots and tubers and fish, which are consumed in excess.

Thus the data presented in Table 38, as a whole indicate that these school going children have ill balanced diet.

4.9.7 Actual food intake of 10-12 year old male and female children

Another category of school going children were those between the age of 10-12 years and there were four boys and two girls. The male children belonged to family no.1, 2 and the girls were from family no.5.

A common feature observed in the diet of these children was that it had a deficit of cereals (20.00 to 25.00 %), milk and milk products (70.00 to 80.00 %), fats and oils (90.00 to 95.00 %), sugar (70.00 to 80.00 %), leafy vegetables (86.00 %) and fruits (40.00 to 88.00 %). However, there was an excess inclusion of roots and tubers and fish. Most of them did not consume neither pulses nor leafy vegetables. When a comparison was made between the boys and girls, a special feature was that 'other vegetables' were included in excess in the diets of boys and the extent of deficiency in different foods were more among girls when compared to boys. A similarity in consumption between the two boys with index no.50 and 51 were observed and it was found that though they belonged to the same family, and their diets were grossly inadequate when compared to others.

4.9.8 Actual food intake of 4-9 year old female children

Table 40, depicts the food intake of three female children who were in the age group of 4-9 years and these children belonged to family no.2 and 11.

When compared with RDA they had inadequate intake of cereals, pulses, leafy vegetables, other vegetables and all other essential foods

Table 39. Mean food intake of 10-12 year old children with respect to different food groups

(n=6)

Family No.		1	2	8	8		5	5
Index No.		48	49	50	51		52	53
		**Food intake, g						
Food groups	RDA	Male children, n=4				RDA	Female children, n=2	
CEREAL + CEREAL PRODUCTS, g	320	355.94	235.13	239.26	261.85	320	236.73	245.50
<i>Percentage adequacy</i>		79.68	73.47	74.76	81.82		73.97	76.71
PULSES, g	60	-	2.78	-	-	60	-	-
<i>Percentage adequacy</i>		-	4.63	-	-		-	-
GREEN LEAFY VEGETABLES, g	100	-	-	14.00	14.00	100	-	-
<i>Percentage adequacy</i>		-	-	14.00	14.00		-	-
OTHER VEGETABLES, g	37	63.13	83.97	-	-	37	-	-
<i>Percentage adequacy</i>		170.62	226.94	-	-		-	-
ROOTS AND TUBERS, g	37	167.70	64.27	9.07	16.90	37	88.27	85.21
<i>Percentage adequacy</i>		453.24	173.70	24.51	45.62		238.56	230.29
FRUITS, g	50	30.00	-	-	-	50	60.00	30.50
<i>Percentage adequacy</i>		60.00	-	-	-		12.00	60.00
MILK AND MILK PRODUCTS, ml	200	70.00	60.00	30.00	30.00	200	45.00	40.00
<i>Percentage adequacy</i>		35.00	30.00	15.00	15.00		22.50	20.00
FATS AND OILS, g	35	3.40	3.56	2.40	2.00	35	3.70	3.70
<i>Percentage adequacy</i>		9.71	10.17	6.85	5.71		10.57	10.57
SUGAR AND JAGGERY, g	50	10.00	10.00	15.00	10.00	50	10.00	10.00
<i>Percentage adequacy</i>		20.00	20.00	30.00	20.00		20.00	20.00
MEAT + FISH + EGG, g	30	32.88	31.71	42.32	50.34	30	33.82	36.12
<i>Percentage adequacy</i>		109.60	105.71	141.06	167.80		112.73	120.40

**Mean of two weighment surveys

*(Source:ICMR, 1968)

Table 40. Mean food intake of female children (4 to 9 years of age) with respect to various food groups

(n=3)

Family No.		2	11		11
Index No.		54	55		56
**Food intake, g					
Food groups	RDA*	Female children, n=2		RDA*	Female child, n=1
CEREAL + CEREAL PRODUCTS, g	200	126.58	156.59	250	75.42
<i>Percentage adequacy</i>		63.00	78.00		70.16
PULSES, g	50	2.42	-	60	-
<i>Percentage adequacy</i>		4.84	-		-
GREEN LEAFY VEGETABLES, g	75	-	-	75	-
<i>Percentage adequacy</i>		-	-		-
OTHER VEGETABLES, g	25	9.30	6.83	25	12.30
<i>Percentage adequacy</i>		37.20	27.32		49.20
ROOTS AND TUBERS, g	25	40.90	41.31	25	14.62
<i>Percentage adequacy</i>		163.60	165.24		58.48
FRUITS, g	50	-	41.81	50	16.81
<i>Percentage adequacy</i>		-	83.62		33.62
MILK AND MILK PRODUCTS, ml	200	60.00	50.00	200	60.00
<i>Percentage adequacy</i>		30.00	25.00		30.00
FATS AND OILS, g	25	1.32	0.66	30	0.51
<i>Percentage adequacy</i>		5.28	2.64		1.70
SUGAR AND JAGGERY, g	40	10.00	10.00	50	10.00
<i>Percentage adequacy</i>		25.00	25.00		20.00
MEAT + FISH + EGG, g	30	38.20	36.75	30	34.64
<i>Percentage adequacy</i>		127.33	122.50		115.46

**Mean of two weighment surveys

*(Source: ICMR, 1989)

except roots and tubers and fleshy foods as in the case of children belonging to other categories.

It was sad to note that these children do not receive green leafy vegetables which are cheap sources of essential nutrients. Thus their diets also seems to be ill balanced.

While summing up, the actual food intake data of the entire population of 56 members belonging to the 15 families categorized on the basis of activity, age and sex collected through weighment survey and presented in Table 36 to 40 reveals that their diets were ill balanced when compared to the requirement individually and collectively. A common feature was that the diet had an excess amount of roots and tubers and fish. On one hand it was deficient in pulses, green leafy vegetables, fats and sugar on the other. As far as the adults was concerned, the diets consumed by the females engaged in sedentary activity was better than males and females engaged in moderate and heavy activity. Compared to adults, the children had a poorer diet though sex wise disparity was not observed.

4.10 ACTUAL NUTRIENT INTAKE OF FAMILY MEMBERS

Apart from satisfying the psychological and social functions, food is consumed directly to cater to the physiological needs of the body. This function of food is carried out by the presence of nutrients in the foods and its availability to the body per se. The food consumed is expected to be utilized by the body in the form of nutrients. Hence the adequacy of diets consumed by the families were evaluated in the presence of essential nutrients by computing the nutritive value of the diets consumed by the individual family members and comparing it with respective recommended nutrient allowances.

As the recommended allowances also varies according to the age, sex, activity and physiological conditions, the adequacy which is an indicator of 'nutrition security' was primarily assessed by the nutrient intake of individual members. The nutrient intake of family members,

categorized into different groups with respect to nutrients are presented in Table 41 to 50.

4.10.1 Actual nutrient intake of heavy workers

The nutrient intake of heavy workers (16 men) in comparison with their RDA along with percentage adequacy are presented in Table 41 and the distribution of members based on nutrient adequacy is given in Table 42.

As indicated in Table 41 against the requirement of 3200 calories, the subjects were found to secure only 1437 kcal (index no.1) to 3086 kcal (index no. 8) indicating that none of them could satisfy their energy requirement. However nine (56.25 %) out of 16 were able to derive 90.00 to 96.00 per cent of their requirement from their diets. It may be noted that the person with index no.1 belonging to family no.1 was not in a position to meet even 50.00 per cent of his requirement.

It was alarming to note that all except one (index no. 7) were found to consume protein much above their requirement. However, the member with the exception was able to meet 99.00 per cent of his requirement from the diet that he consumed.

The levels of fat consumption revealed that (25.00 %) had excess intake. While eight (50.00 %) had an adequacy ranging between 75-99 per cent and the remaining were consuming 50.00 to 74.00 per cent of their requirement.

As far as the mineral adequacy was concerned, subjects with index no. 14 and 16 were able to procure 50.00 to 96.00 per cent of their requirement for calcium and iron from the diet. It was seen that two persons (index no.5 and 15) family no. 5, 14 had a slightly higher intake when compared to others.

The vitamin A supplied by beta carotene and retinol through the diets were found to be insufficient as indicated by the fact that 81.25 per

Table 41. Mean nutrient intake and percentage of adequacy of heavy workers

(n=16)

Family No.		1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
Index No.		1	2	3	4	5	6	7	8	9	10	11	112	13	14	15	16
Nutrients	*RDA	**Nutrient intake															
PROTEIN, g	50	60.95	59.09	100.34	65.32	80.50	80.61	49.47	72.29	87.95	54.56	94.09	78.99	64.18	62.91	77.45	72.50
Percentage adequacy		121.9	118.18	167.2	130.64	161.00	161.22	98.94	144.58	175.90	109.12	188.18	157.98	128.36	125.82	154.90	145.00
CALORIE, kcal	3200	1437.50	2992.62	2358.12	29.67.5	3004.69	3077.55	3086.08	3086.94	2894.69	2790.00	2778.33	2662.67	2892.74	3013.53	2951.37	3018.32
Percentage adequacy		44.92	93.51	73.69	92.73	93.89	96.17	96.44	96.46	90.45	87.18	86.82	83.20	90.39	94.17	92.23	94.32
FAT, mg	15	13.01	15.79	11.33	9.53	10.92	7.83	16.13	12.05	8.97	18.77	19.39	14.18	11.62	14.03	12.61	13.29
Percentage adequacy		86.73	105.26	75.50	63.53	72.80	52.20	107.53	80.33	59.80	125.13	129.26	94.53	77.46	93.53	84.06	88.60
CALCIUM, g	400	244.57	232.75	210.96	335.86	326.41	373.84	212.67	337.67	320.07	292.19	213.38	386.30	367.12	278.94	394.54	216.47
Percentage adequacy		61.42	58.18	52.74	83.96	81.60	93.46	53.16	84.39	80.01	73.04	53.34	96.57	91.03	69.73	98.63	54.11
IRON, mg	30	25.83	28.06	21.06	29.82	33.11	26.69	23.10	27.08	28.48	28.77	21.07	25.35	24.20	25.67	35.28	27.18
Percentage adequacy		86.10	93.53	70.20	99.40	110.36	98.96	77.00	90.26	94.93	95.90	70.23	84.50	80.66	85.56	117.60	90.60
B.CAROTENE, µg	2400	316.22	328.60	411.21	645.49	395.16	272.92	198.58	306.62	455.80	703.00	77.38	542.11	353.26	523.35	564.08	618.56
Percentage adequacy		13.17	13.69	17.13	26.89	16.46	11.37	8.27	12.77	18.99	29.29	32.34	22.58	14.71	21.80	23.50	25.77
RETINOL, µg	600	232.89	171.76	309.33	355.96	266.06	166.72	250.91	144.00	318.96	164.39	638.99	393.18	224.48	257.81	427.45	327.26
Percentage adequacy		38.81	28.62	51.55	59.32	44.34	27.78	41.81	24.00	53.15	27.39	106.49	65.53	37.41	42.96	71.24	54.54
THIAMINE, mg	1.6	1.53	1.65	0.85	1.14	1.53	1.91	0.92	1.30	1.50	1.10	0.89	1.20	1.63	1.45	1.58	1.40
Percentage adequacy		95.62	103.10	77.27	71.25	80.52	119.37	57.50	81.25	93.75	68.75	98.88	75.00	101.87	90.62	98.75	87.5
RIBOFLAVIN, mg	1.9	0.71	0.84	0.35	0.60	0.85	0.80	0.34	0.74	0.67	0.62	0.52	0.64	0.83	0.74	0.90	0.72
Percentage adequacy		37.36	44.20	18.42	31.57	44.73	42.10	17.89	38.94	35.26	32.63	47.27	33.68	43.68	38.94	47.36	37.89
NIACIN, mg	21	13.63	15.44	15.70	20.17	29.02	28.60	15.22	25.83	21.33	21.79	12.98	25.41	18.35	22.75	20.00	7.85
Percentage adequacy		64.90	73.52	74.76	96.04	138.19	136.19	72.47	123.00	101.57	103.76	108.16	121.00	87.38	108.33	95.33	37.38
VIT.AMIN C, mg	40	17.95	29.43	10.91	16.41	13.95	11.08	16.14	14.61	13.19	11.82	13.89	24.31	25.09	17.91	12.56	26.32
Percentage adequacy		44.87	73.57	27.20	41.02	34.87	27.70	40.35	36.52	32.97	29.55	34.72	60.77	62.72	44.77	31.40	65.80

**Mean of two weighthment surveys

*(Source:ICMR, 1989)

cent out of 16 were able to meet less than 25.00 per cent of their requirement. Though the subjects were all non-vegetarians, 50.00 per cent were found to meet less than 50.00 per cent of their requirement only. However, the subject no.11 from family no.11 alone was found to have an adequate intake of retinol.

When the availability of B-complex vitamins namely thiamine, riboflavin and niacin were calculated majority had a poor intake of riboflavin less than 50.00 per cent of the requirement.

However the thiamine intake ranged from 57.50 to 119.37 per cent indicating that more than 12 (75.00 %) out of 16 had an intake above 80.00 per cent of the requirement.

The niacin intake was also found to be a satisfactory range since, 11 (68.75 %) had it above 87.38 per cent of requirement. However, one person (index no.16) from family no. 15 had the lowest intake meeting only 37.38 per cent of the requirement.

Vitamin C seems to be one of the inadequate nutrients supplied by the diet. Seventy five per cent were able to meet less than 50.00 per cent of their requirement. Though none had an intake below 25.00 per cent.

Table 42. Distribution of heavy workers based on the percentage adequacy of different nutrients

Nutrients	Percentage adequacy					Total
	≥ 100	75-99	50-74	25-49	< 25	
Protein, g	15	1	-	-	-	16
Calorie, kcal	-	14	1	1	-	16
Calcium, mg	-	8	8	-	-	
Iron, mg	2	12	2	-	-	16
B-carotene, ug	-			3	13	16
Retinol, mg	1	-	6	8	1	16
Thiamine, mg	3	-	10	3	-	16
Riboflavine, mg	-	-	-	14	2	16
Niacin, mg	8	3	4	1	-	16
Vitamin C, mg	-	-	4	12	-	16
Fat, g	4	8	4	-	-	16

4.10.2 Actual nutrient intake of adults with moderate activity

The data presented in Table 43, depicts the nutrient intake and adequacy among the adult male and females.

As far as the male worker who belongs to family no.9 was concerned, his nutrient intake seems to be poor, though he was able to satisfy his protein and calorie needs. The diet consumed by him seems to be grossly deficient in vitamin A, riboflavin, vitamin C, fat and calcium.

The females belonged to family no.3, 5 and 9 and their diet seemed to be worse when compared to that of men in the similar category. All the three had inadequate intake of all the items except protein, which was found to be taken in excess by index no.18 and 20, though index no.20 had about 11.00 per cent deficiency in the intake of protein also. These members had inadequacies ranging from 48.36 to 78.00 per cent in all the minerals and vitamins which indicates that their diet needs to be modified. All the three had energy deficient ranging from 8.00 to 19.00 per cent which could be attributed due to low intake of fat as shown in Table 43.

4.10.3 Actual nutrient intake of sedentary male workers

The sedentary workers constitute, the major proportion of the subjects studied. The nutrient intake and adequacy of the three male subjects belonging to family no.3, 10 and 14 are presented in Table 44. Here again, the data indicated, that the diets are grossly deficient in protective nutrients such as vitamins and minerals.

With reference to the adequacy of nutrients, the member from family no.3 (index no.38) was found to have deficiency in calories to an extent of 39.00 per cent and his fat intake was 71.00 per cent below RDA. His protein intake was also slightly inadequate, while there were over-welming deficiency with respect to vitamin A (-85.00 %), riboflavin (-78.00 %) calcium (-53.00 %), Vitamin C (-42.00 %) indicating that his dietary pattern is far from satisfactory. The nutrient intake of the member from family no: 10 (index no.39) was found to be

Table 43. Mean nutrient intake of adult males and females doing moderate activity

(n=4)

Family No.		9			3		5		9	
Index No.		17			18		19		20	
Nutrients	**Nutrient intake									
	*RDA	Moderate adult male (n=1)		*RDA	Moderate adult females, n=3					
PROTEIN, g	60	62.66	4	50	65.32	30	44.97	-11	72.05	44
Percentage adequacy		104.43			130.64		89.98		144.10	
CALORIE, kcal	2700	2661.54	-2	2100	1932.49	-8	1843.92	-13	1720.89	-19
Percentage adequacy		98.52			92.02		87.80		81.95	
FAT, mg	15	7.88	-48	15	3.84	-98	3.47	-77	5.76	-62
Percentage adequacy		52.33			2.56		23.13		38.40	
CALCIUM, g	400	302.66	-25	400	155.50	-62	89.32	-78	182.32	-55
Percentage adequacy		75.66			38.87		22.33		45.58	
IRON, mg	28	26.03	-8	30	14.51	-52	10.79	-65	18.83	-38
Percentage adequacy		92.96			48.36		35.96		62.76	
B-CAROTENE, µg	2400	374.86	-85	3400	271.76	-89	245.91	-90	246.68	-90
Percentage adequacy		15.61			11.32		10.24		10.27	
RETINOL, µg	600	249.71	-59	600	180.72	-70	184.17	-70	121.74	-80
Percentage adequacy		41.61			30.12		30.69		20.29	
THIAMINE, mg	1.4	1.35	-4	1.1	0.63	-43	0.43	-31	0.76	-31
Percentage adequacy		96.42			57.27		39.09		69.09	
RIBOFLAVIN, mg	1.6	0.59	-64	1.3	0.26	-80	20.00	-85	0.33	-75
Percentage adequacy		36.87			0.20		15.38		25.38	
NIACIN, mg	18	17.68	-2	14	12.14	-14	5.95	-58	11.78	-16
Percentage adequacy		98.22			86.71		42.50		84.14	
VITAMIN-C, mg	40	23.13	-43	40	15.72	-61	20.90	-48	14.99	-63
Percentage adequacy		57.82			39.30		52.25		37.47	

**Mean of two weighment surveys

*(Source:ICMR, 1989)

Table 44. Mean nutrient intake of adult males doing sedentary work

		(n=3)					
Family No.		3		10		14	
Index No.		38		39		40	
		**Nutrient intake					
Nutrient	*RDA	Sedentary adult male, n=3					
PROTEIN, g	60	56.58	-6	64.13	+6	71.36	+18
<i>Percentage adequacy</i>		94.30		106.88		118.93	
CALORIE, kcal	2350	1446.59	-39	2673.99	+13	2274.13	-4
<i>Percentage adequacy</i>		61.55		113.78		96.77	
FAT, mg	15	4.40	-71	11.27	-25	11.99	-21
<i>Percentage adequacy</i>		29.33		75.13		79.93	
CALCIUM, g	400	188.60	-53	392.36	-2	450.94	-12
<i>Percentage adequacy</i>		47.15		98.09		112.73	
IRON, mg	28	17.71	-37	26.99	-4	24.15	-14
<i>Percentage adequacy</i>		63.25		96.39		86.25	
B.CAROTENE, mg	2400	365.79	-85	551.60	-78	339.71	-86
<i>Percentage of adequacy</i>		15.19		22.98		14.15	
RETINOL, µg	600	261.08	-57	213.24	-65	210.70	-65
<i>Percentage adequacy</i>		43.51		35.54		35.11	
THIAMINE, ug	1.2	0.75	-38	1.07	-11	1.11	-8
<i>Percentage adequacy</i>		62.50		89.16		92.50	
RIBOFLAVIN, mg	1.4	0.32	-78	0.58	-59	0.63	-55
<i>Percentage adequacy</i>		22.85		41.42		45.00	
NIACIN, mg	16	10.40	-35	16.84	+5	20.56	+28
<i>Percentage adequacy</i>		65.00		105.25		128.50	
VITAMIN- C, mg	40	23.31	-42	15.50	-62	39.85	-1
<i>Percentage adequacy</i>		58.27		38.75		99.62	
FAT, mg	15	4.40	-71	11.27	-25	11.99	-21
<i>Percentage adequacy</i>		29.33		75.13		79.93	

**Mean of two weightment surveys

*(Source:ICMR, 1989)

satisfactory with respect to calorie, protein and niacin. His diet seems to be lacking particularly in β -carotene (-78.00 %), vitamin C (-62.00 %), retinol (-65.00 %), riboflavin (-59.00 %), fat (-25.00 %) indicating dietary imbalance.

The male worker from family no.3 seems to have a positive balance with respect to protein and niacin intake, other nutrients being inadequate. The deficiencies of vitamin A and riboflavin were prominent, though the diet was deficient marginally in energy, calcium, iron, and thiamine and fat. Thus the nutrient intake of this sedentary group of adult males seems to be far from satisfaction.

4.10.4 Actual nutrient intake of females doing sedentary activity

Table 45 and 46, picturises the nutrient intake and percentage adequacy and distribution of 17 female sedentary workers according to the adequacy of nutrients that they consume.

The data presented in Table 45 and 46, indicated that the diets consumed in general by these sedentary women seems to be adequate with respect to calories and protein. It may also be noted that majority had an intake of energy 10.00 to 14.00 per cent above the requirement.

The protein intake was found to be satisfactory for seven (41.17 %) out of 17 and the remaining were able to procure 70.00 to 90.00 per cent of their requirement from their diet.

As far as fat intake was concerned this segment seems to be in a better position than others. Since, 13 (76.47 %) out of 17 were able to meet more than 75.00 per cent of their requirement, and eight were consuming more fat than what they require.

The adequacy of calcium was found to range from 56.00 per cent and above for all members except index no.13 belonging to family no.11 and only two had a calcium intake below 50.00 per cent.

Table 45. Mean nutrient intake of females doing sedentary work

(n=17)

Family No.		1	2	3	4	5	6	7	8	9	10	10	11	11	12	13	14	15
Index No.		21	22	23	24	25	20	27	28	29	30	31	32	33	34	35	36	37
Nutrients	RDA*	**Nutrient intake																
PROTEIN, g	60	49.92	49.92	35.48	53.79	66.44	62.77	56.46	45.33	51.53	51.89	57.88	58.91	48.41	59.52	62.42	53.33	47.81
Percentage adequacy		99.84	83.20	70.96	89.65	110.73	104.61	94.10	75.55	85.88	103.15	96.46	98.18	80.68	99.20	104.03	88.88	79.68
CALORIE, kcal	1800	2532.54	2539.11	1776.75	2756.75	2150.57	2448.85	2547.29	1857.85	1853.38	1884.85	1992.11	1629.64	1730.53	2241.00	2362.04	2048.62	2442.80
Percentage adequacy		140.69	141.06	98.70	153.15	119.47	136.04	141.51	102.65	102.96	104.71	110.67	90.53	96.14	124.50	131.22	113.81	135.71
FAT, mg	15	11.01	14.42	8.74	10.48	15.64	24.46	11.50	15.68	15.18	16.46	14.3	12.76	13.85	21.56	15.48	19.25	10.30
Percentage adequacy		73.4	96.1	58.00	69.86	104.26	163.06	76.66	104.53	101.02	109.73	95.33	85.06	92.33	143.73	103.20	128.33	68.66
CALCIUM, g	400	329.93	580.49	150.91	311.00	372.68	295.86	289.42	339.29	298.67	285.46	329.62	226.97	136.17	430.43	309.47	427.09	587.40
Percentage adequacy		82.48	145.12	37.72	77.75	93.17	73.96	72.35	84.82	74.66	63.86	82.40	56.74	34.04	107.60	77.36	106.77	146.85
IRON, mg	28	27.93	29.40	14.26	25.60	25.64	26.06	15.88	22.08	20.24	18.51	22.31	16.42	14.54	36.62	22.93	24.20	28.11
Percentage adequacy		99.75	105.00	50.92	91.42	91.57	93.07	56.71	78.85	72.28	66.10	79.67	58.64	51.92	130.78	81.89	86.42	100.39
B-CAROTENE, µg	2400	264.24	835.02	253.03	560.70	374.79	191.82	218.20	309.88	323.40	810.62	1476.30	431.21	369.65	1124.31	378.34	284.34	416.08
Percentage adequacy		11.01	34.75	10.55	23.36	62.46	7.99	9.09	12.91	13.47	33.77	61.51	17.96	15.40	46.84	15.76	11.84	17.33
RETINOL, µg	600	160.08	292.05	169.67	271.14	261.88	90.77	146.34	201.26	210.37	696.04	367.61	330.20	277.32	928.11	211.02	134.55	277.50
Percentage adequacy		26.68	48.67	28.20	45.19	43.64	15.12	24.39	33.54	35.06	116.00	61.16	56.17	46.22	154.68	35.15	22.42	46.25
THIAMINE, mg	0.9	0.35	1.04	0.61	0.49	1.18	1.38	0.76	0.69	1.06	0.79	0.80	0.72	0.61	0.42	1.05	1.10	1.10
Percentage adequacy		38.8	115.5	67.7	54.44	131.11	153.33	34.44	76.66	117.77	87.77	88.88	80.00	67.77	46.66	116.66	122.22	122.22
RIBOFLAVIN, mg	1.1	0.50	0.50	0.25	0.48	0.61	0.57	0.41	0.56	0.50	0.41	0.45	0.39	0.31	0.71	0.57	0.58	0.54
Percentage adequacy		45.45	45.45	22.7	43.63	55.45	51.81	37.27	50.90	45.45	37.27	40.90	35.45	28.18	65.54	51.81	52.12	49.09
NIACIN, mg	12	11.87	13.78	11.81	11.16	12.36	14.61	10.51	14.99	9.59	12.83	17.36	13.60	9.50	10.48	11.31	8.75	11.11
Percentage adequacy		98.9	110.60	98.4	93.00	103.00	121.75	87.58	124.91	79.91	106.91	61.33	113.33	79.16	87.33	94.25	72.91	92.58
VITAMIN C, mg	40	74.79	33.28	52.16	19.07	45.99	42.48	42.87	60.56	16.43	18.71	21.21	19.81	29.19	35.26	45.29	25.40	32.08
Percentage adequacy		186.9	83.20	130.40	47.67	114.97	106.20	107.17	41.40	136.91	46.77	53.02	49.52	72.97	82.15	118.22	63.50	80.20

**Mean of two weighment surveys

*(Source:ICMR, 1989)

The iron intake of this segment seems to be comparatively better than the other groups evaluated earlier since six (32.29%) out of 17 were able to meet more than 90.00 per cent of requirement and none had an intake below 50.00 per cent of the requirement.

Similar to the earlier picture vitamin A seems to be deficient in the diets of these sedentary women, since 82.35 per cent had a vitamin A intake that could meet only less than 50.00 per cent of the requirement. More over, 12 (70.58 %) had an intake below 25.00 per cent.

Deficient intake of riboflavin (between 49.00 to 29.00 per cent adequacy) is another feature of the diet consumed by this group.

The table further indicates that members with index nos. 23, 24, 32 and 34 respectively belonging to family no.3, 4 and 10 had deficiencies of ten nutrients out of the 11 nutrients listed and index no. 21 and 27 belonging to family nos.1 and 7 had inadequacies in nine of the nutrients. Moreover it was found that, the two women coming from family no: 5 and 6, were found to have minimum number of five nutrients lacking in their diet. This inference indicates that the diets of these women are nutritionally inadequate.

Table 46. Distribution of sedentary females with respect to adequacy of various nutrients

Nutrients	Percentage of adequacy					Total
	≥ 100	75-99	50-74	25-49	< 25	
Protein, g	4	12	1	-	-	17
Calorie, mg	14	3	-	-	-	17
Fat, g	8	5	4	-	-	17
Calcium, ,mg	4	6	5	2	-	17
Iron, mg	3	8	6	-	-	17
B-carotene, ug	-	-	2	3	12	17
Retinol, mg	2	-	2	10	3	17
Thiamine, mg	7	4	3	2	-	17
Riboflavine, mg	-	-	6	10	1	17
Niacin, mg	6	9	2	-	-	17
Vitamin C, mg	7	3	3	4	-	17

4.10.5 Actual nutrient intake of adolescents

Results presented in Table 47, gives the nutrient intake as well as nutrient adequacy of adolescents children.

In this group, there were two members (one boy and one girl) and both are found to be deficient in all the nutrients except protein, which is consumed slightly above the normal requirement.

Though there are minor variation in the inadequacies exhibited between the two subjects. The deficiency pattern seems to be more or less identical. The most deficient items are vitamin C, fat and riboflavin. Their calorie intake was sufficient to meet only 90.00 per cent of their requirement.

4.10.6 Actual nutrient intake of 13-15 year old children

The nutrient composition of the diets consumed by children belonging to the age group of 13-15 years comprising of two male members and three female members are presented in Table 48.

The two female children (index no.46 and 47) and one male child (index no.44) all belonged to one single family *viz.* family no.6. All the three had a deficient diet lacking in all nutrients except protein which again was found to be lacking in the case of female child with index no.44. And the extent of deficiency was again similar for all the nutrients for both the female children. But when the boy and these two girls were compared, the extent of deficiency was lesser in the case of the boy. With respect to the two boys one from family no.1 and other from family no.15 both had a poor diet. It was noted that male child with index no.45 had a surplus intake of energy while index no.43 had a slightly low intake. Thus when these two boys were compared boy no.1 had a greater inadequacy of most of the nutrients when compared to boy no.3. The data in nutshell indicates that, these boys and girls do not consume a diet of quality with respect to its nutrient content.

Table 47. Mean nutrient intake and percentage adequacy of adolescent male and female children (16-18 years old)

(n=2)

Family No.		13		45	
Index No.		41		42	
**Nutrient intake					
Nutrient	*RDA	Adolescent male (n=1)	*RDA	Adolescent female (n=1)	
PROTEIN, g	79	81.68	65	67.85	4
<i>Percentage adequacy</i>		103.39		104.33	
CALORIE, kcal	2600	2329.73	2050	1845.72	-10
<i>Percentage adequacy</i>		89.60		90.03	
FAT, mg	15	9.78	15	7.89	48
<i>Percentage adequacy</i>		65.20		52.60	
CALCIUM, g	500	371.06	500	426.65	-15
<i>Percentage adequacy</i>		74.21		85.33	
IRON, mg	50	27.93	30	23.60	-22
<i>Percentage adequacy</i>		55.86		78.66	
B-CAROTENE, µg	2400	484.00	2400	416.18	-83
<i>Percentage adequacy</i>		20.16		17.34	
RETINOL, µg	600	200.62	600	304.77	-50
<i>Percentage adequacy</i>		33.43		50.79	
THIAMINE, mg	1.3	1.29	1.0	0.95	-5
<i>Percentage adequacy</i>		99.23		95.00	
RIBOFLAVIN, mg	1.6	0.71	1.2	0.49	-60
<i>Percentage adequacy</i>		44.37		40.83	
NIACIN, mg	17	12.02	14	10.62	-25
<i>Percentage adequacy</i>		70.70		75.85	
VITAMIN-C, mg	40	15.05	40	20.64	-49
<i>Percentage adequacy</i>		37.62		51.60	

**Mean of two weighment surveys

*(Source: ICMR, 1989)

Table 48. Mean nutrient intake and percentage adequacy of 13-15 years male and female children

(n=5)

Family No.		6		6			1		6		15	
Index No.		46		47			43		44		45	
Nutrient	**Nutrient intake											
	Female children, n=2						Male children, n=3					
	RDA*					RDA*						
PROTEIN, g		69.76		63.93			68.66		82.78		87.20	
Percentage adequacy	67	104.11	4	95.41	-5	71	96.70	-4	116.59	+16	122.81	+22
CALORIE, kcal		1927.44		1841.42			1898.8		1856.21		1924.99	
Percentage adequacy	2050	94.02	-6	89.82	-11	2400	79.11	-21	77.34	-23	80.20	-20
FAT, mg		6.87		6.14			5.36		17.30		7.33	
Percentage adequacy	15	45.80	-55	15.35	-85	15	35.13	-65	115.33	-15	48.88	-52
CALCIUM, g		237.17		221.83			246.20		339.67		529.01	
Percentage adequacy	600	39.52	-61	36.97	-64	600	41.03	-59	56.61	-44	88.16	-12
IRON, mg		23.27		21.63			20.49		29.87		25.47	
Percentage adequacy	28	83.10	-17	77.85	-23	43	47.65	-53	69.46	-31	59.23	-41
B-CAROTENE, µg		161.50		149.87			486.51		241.69		385.31	
Percentage adequacy	2400	6.72	-94	6.24	-94	2400	19.52	-81	10.07	-90	16.05	-84
RETINOL, µg		55.71		58.93			143.98		171.11		276.62	
Percentage adequacy	600	9.28	-91	9.82	-91	600	23.99	-77	28.51	-72	46.10	-54
THIAMINE, mg		0.70		0.80			1.05		1.10		0.99	
Percentage adequacy	1.0	70.00	-30	80.00	-20	1.2	87.50	-13	91.66	-9	82.50	-18
RIBOFLAVIN, mg		0.48		0.45			0.47		0.67		0.48	
Percentage adequacy	1.2	40.00	-60	37.50	-63	1.4	33.57	-67	47.85	-53	34.28	-66
NIACIN, mg		13.82		13.05			15.12		12.87		12.93	
Percentage adequacy	14	98.71	-2	93.21	-7	16	94.50	-6	80.43	-20	80.81	-20
VITAMIN C, mg		13.62		14.70			11.86		14.50		17.96	
Percentage adequacy	40	34.05	-66	36.75	-64	40	29.65	-71	36.25	-64	44.90	-56

**Mean of two weighment surveys

*(Source:ICMR, 1989)

Table 49. Nutrient intake and percentage adequacy of 10-12 year male and female children

(n=6)

Family No.		1	2	8	8		5	5
Index No.		48	49	50	51		52	52
**Nutrient intake								
Nutrient	RDA	Male children, n=4				RDA	Female children, n=3	
PROTEIN, g	53	61.23	53.39	60.69	58.80	85	62.12	52.74
Percentage adequacy		115.52	102.62	114.50	110.94		112.94	95.89
CALORIE, kcal	2150	1677.28	1429.81	1737.14	1847.29	1950	1822.33	1502.38
Percentage adequacy		78.01	66.50	80.79	85.92		93.45	77.04
FAT, mg	15	4.39	9.97	9.03	4.44	15	5.66	4.91
Percentage adequacy		29.26	66.46	60.20	29.60		37.73	32.73
CALCIUM, g	600	218.54	318.43	166.73	226.64	600	289.08	216.72
Percentage adequacy		36.42	53.07	27.78	137.77		48.18	36.12
IRON, mg	28	16.99	15.12	9.91	13.08	20	17.73	14.56
Percentage adequacy		60.67	54.00	35.39	46.71		88.65	72.8
B.CAROTENE, µg	2400	210.45	414.59	140.37	250.93	2400	215.06	186.64
Percentage adequacy		8.76	17.27	5.84	10.45		8.96	7.77
RETINOL, µg	600	137.01	314.51	39.83	199.65	600	115.62	89.86
Percentage adequacy		22.83	52.41	6.63	33.27		19.27	14.97
THIAMINE, mg	1.1	0.86	0.57	0.42	0.64	1.0	0.85	0.68
Percentage adequacy		78.18	51.81	38.18	58.18		85.00	0.68
RIBOFLAVIN, mg	1.3	0.40	0.28	0.22	0.40	1.2	0.43	0.34
Percentage adequacy		30.76	21.53	16.92	30.76		35.83	28.33
NIACIN, mg	14	12.36	11.17	8.26	13.05	13	11.55	10.33
Percentage adequacy		88.28	79.78	59.00	93.21		88.84	79.46
VITAMIN-C, mg	40	38.99	20.55	22.92	22.38	40	39.96	34.8
Percentage adequacy		97.47	51.37	57.30	55.95		99.90	85.20

**Mean of two weighment surveys

*(Source:ICMR, 1989)

Table 50. Mean nutrient intake and percentage adequacy of children in the age group of 4 – 9 years

(n=3)

Family No.		2		22			11	
Index No.		54		55			56	
**Nutrient intake								
Nutrients	RDA	Female children (4-6 years),n=2				RDA	7-9 year female children	
		Nutrient intake	Percentage adequacy	Nutrient intake	Percentage adequacy		Nutrient intake	Percentage adequacy
PROTEIN, g	31	39.51	+27	29.52	-5	41	41.12	0
<i>Percentage adequacy</i>		127.45		95.22			100.29	
CALORIE, kcal	1600	953.09	-41	602.32	-63	1925	1579.43	-18
<i>Percentage adequacy</i>		59.56		37.64			82.04	
FAT, mg	20	5.71	-72	8.11	-60	15	6.61	-56
<i>Percentage adequacy</i>		28.55		40.55			44.06	
CALCIUM, g	400	181.37	-55	102.31	-75	400	83.39	-80
<i>Percentage adequacy</i>		45.34		25.57			20.84	
IRON, mg	18	8.69	-52	5.96	-67	25	42.67	-70
<i>Percentage adequacy</i>		48.27		33.11			170.68	
B.CAROTENE, µg	1600	221.27	-91	240.84	-85	2400	197.62	-92
<i>Percentage adequacy</i>		9.23		15.05			8.23	
RETINOL, µg	400	30.08	-93	17.65	-81	600	96.72	-84
<i>Percentage adequacy</i>		7.52		19.41			16.12	
THIAMINE, mg	8	0.83	3	0.72	-10	1.0	0.91	-9
<i>Percentage adequacy</i>		103.75		90.00			91.00	
RIBOFLAVIN, mg	1.0	0.50	-50	0.51	-49	1.2	0.13	-90
<i>Percentage adequacy</i>		50.00		51.00			10.83	
NIACIN, mg	11	6.26	-44	3.52	-68	13.0	2.97	-78
<i>Percentage adequacy</i>		56.90		32.00			22.84	
VITAMIN C, mg	40	14.09	-65	15.90	44	40	19.27	-52
<i>Percentage adequacy</i>		35.22		144.54			48.17	

**Mean of two weighment surveys

*(Source:ICMR, 1989)

4.10.7 Actual nutrient intake of 10-12 years old children

The nutrient adequacy and intake of children in the age group of 10-12 who were six in number comprising of four boys and two girls are presented in Table 49. This table presents the fact that except the girl from family no.5 (index no.52) all have deficient intake of all nutrients and the level of deviation from the standard varied between the children and between the nutrients on a wide range. However, the deficiency of nutrients such as calcium, vitamin A, riboflavin fat and calories seems to dominate, which gives the indication that these children do not get an adequate diet that would supply energy giving, body building or protective nutrients in sufficient amounts.

4.10.8 Actual nutrient intake of 4-9 year old female children

A similar picture of inadequacy of majority of nutrients is seen in Table 50, which gives the mean nutrient intake and percentage adequacy and distribution of children according to nutrient adequacy. This table gives an interesting fact that, the diets of all the children were most inadequate, with a prominent inadequacy in energy itself, which indicates malnutrition as well as prominent under nutrition. The level of inadequacy in most of the nutrients varied from 49.00 to 93.00 per cent, the most deficient nutrients being calcium, vitamin A, riboflavin, niacin, vitamin C and fat. However, individual variation between children with respect to extent of inadequacy could be clearly seen.

4.11 ENERGY BALANCE AND ADEQUACY AMONG EMPLOYED ADULT MEMBERS OF THE FAMILIES

Energy consumption has been used as a yardstick to measure under nutrition as well as to assess poverty status. The energy intake of all the

56 members categorized into different groups had been calculated from the weighment data and had been presented in Table 41 to 50.

Out of the 56, 16 are children and among the 40 adults, 27 were employed outside the family (16 heavy workers + 4 moderate workers + 7 sedentary workers). These subjects would require more energy than the unemployed counter parts. Since, their work demands extra energy which varies according to the type of activity and hence the energy expenditure. Therefore, an attempt was made to compare energy intake of the subjects with their energy expenditure so as to arrive at their energy balance as well as energy adequacy with respect to intake in comparison with their requirement. The above data with respect to employed adults belonging to heavy, moderate and sedentary categories are presented in Table 51, 52 and 53.

4.11.1 Energy intake and expenditure of Heavy workers

Table 51. Energy intake, energy expenditure and energy adequacy of heavy workers (men)

(n=16)

Family No.	Age, years	Index no.	Weight, kg	Energy intake, kcal	Energy expenditure, kcal	Energy balance	Energy adequacy with respect to 3200 kcal RDA (%)
1	38	1	55	2640	2269	+371	82
2	48	2	35	2951	2646	+305	92
3	50	3	48	2358	3299	-941	73
4	23	4	48	2831	3208	-377	88
5	37	5	58	3057	3696	-639	95
6	39	6	49	3157	3581	-424	98
7	51	7	42	3185	3123	+62	99
8	45	8	48	2986	3581	-595	93
9	58	9	58	2790	3390	-600	87
10	52	10	48	2872	2865	+7	89
11	60	11	49	2703	3299	-596	84
	32	12	60	2853	3924	-1071	89
12	57	13	58	2826	3484	-658	88
13	42	14	52	3193	3550	-357	99
14	46	15	49	2952	2232	+720	92
15	38	16	47	3045	3348	-303	95
Mean	44.75		50.25	2900	3218	-318	

The energy intake, energy expenditure and energy adequacy (intake with respect to RDA) presented in Table 51 revealed that 12 adults with index nos.3, 4, 5, 6, 8, 9, 11, 12, 13, 14 and 16 belonging to family nos. 3, 4, 5, 6, 8, 9, 11, 12, 13 and 15) had greater energy expenditure than their energy intake resulting in a negative balance. The excess energy consumed by these twelve subjects varied from 303 to 1071 kcal, while five subjects with (index nos. 1, 2, 7, 10 and 14) had positive energy balance. However, when the energy intake was compared with RDA, none of the subjects had adequate energy intake and the level of inadequacy varied from 0.5 to 27.0 per cent. Though only 68.00 per cent had a negative balance when their intake and expenditure of energy were compared.

4.11.2 Energy intake and energy expenditure of adult male and females doing moderate activity

Table 52. Energy intake, energy balance and energy adequacy of adult males and females doing moderate activity

(n=4)								
Family No.	Age, years	Sex	Index no.	Weight, kg	Energy intake, kcal	Energy expenditure, kcal	Energy balance	Energy adequacy with respect to 2100, 2700 kcal, RDA (%)
3	40	Female	18	36	1938	1953	-15	92
5	55	Female	19	47	1859	2320	-461	88
9	48	Female	20	49	1721	2332	-61	81
9	26	Male	17	68	2660	2740	-80	98
Mean	47.66			44.16	1839	2201	362	

Distribution of adult male and females doing moderate activity with respect to the energy balance and adequacy presented in Table 52 reveals that all the four are in negative energy balance and their energy adequacy varied from 81.00 to 98.00 per cent. A special feature to be noted from Table 52 is that the female member from family no.3 who had the least

deviation between energy intake and expenditure has the lowest weight of 36 kg. While her age is 40 years which indicates gross malnutrition.

4.11.3 Energy intake, energy balance and energy adequacy of adult males and females doing sedentary activity

Table 53. Energy intake, energy balance and energy adequacy of adult males and females doing sedentary activity

(n=5)

Family No.	Age, years	Sex	Index no.	Weight, kg	Energy intake, kcal	Energy expenditure, kcal	Energy balance	Energy adequacy with respect to 1800, 2350 kcal, RDA (%)
4	48	Female	24	33	2042	1738	+304	113
10	23	Female	30	45	1727	1855	-128	95
10	55	Female	31	41	2310	1820	+490	128
12	48	Female	34	56	1828	2082	-254	101
13	55	Female	35	48	2057	1771	+286	114
10	25	Male	39	45	2762	1865	+897	117
14	22	Male	40	48	2282	2243	+39	97

The data reveals except two adults respectively from family no.10 and 12, the sedentary workers in general were found to have positive energy balance and adequacy was checked between energy intake and RDA, except one male and a female who had mild in adequacy. On other side all had excess energy intake.

Thus the energy balance computation as revealed that out of the 27 employed adults 17 (62.96 %) had a negative balance. Heavy and moderate workers were found to suffer from energy inadequacy more than the sedentary workers. When the male and female workers were compared, more females had a negative balance than men specially among moderate workers, though such difference was not seen among sedentary workers.

4.12 ANTHROPOMETRIC MEASUREMENTS OF FAMILY MEMBERS

A part from diet survey and weight survey, anthropometry, haemoglobin level estimation and clinical examination were carried out to

assess the nutritional status as well as the extent of utilization of the nutrients by the body which is a measure of food security.

4.12.1 Anthropometric measurements of adult males

Anthropometric measurements of adult males (20) are presented in Table 54. The total number of adult males were 20 including one male member from each of the family. The age of these twenty males ranged from 21 to 60 years.

It is clear from the data that their height varied from a minimum of 150.00 cm to a maximum of 167.00 cm (with a mean of 155.63 ± 5.79 cm) and the weight varied from 35 kg to 60 kg with a mean of 49.78 ± 6.08 kg.

When the data on weight and height were used to calculate the BMI of individual members, it varied from 15.50 to 25.00 cm (with a mean of 20.74 ± 2.51 cm). The body mass index of these subjects varied from reference standard by -0.5 to -4.5.

When the BMI of the adult males were further analysed, it was clear that 13 subjects (55.00 %) subjects belonging to family no.1, 3, 4, 5, 6, 8, 9, 11 and 12, had normal BMI values and the remaining seven subjects had lower value, indicating energy deficiency of varying levels. Among the seven subjects, five could be designated as 'low weight normal' and they belonged to family no.3, 7, 10, 13 and 15. One adult from family no.10 (index no.39) had CED of Grade II level, while the subject from family no.3 (index no.2) had CED of levels III (Severe).

The Mid Upper Arm Circumference (MUAC) of the adult males were analysed and the data indicated that the values varied from a minimum of 20.00 cm to a maximum of 29.30 cm (mean 24.96 ± 2.75 cm)

As far as the MUAC of the subjects were concerned, only one subject from family no.9 (index no.9) had normal value and others had lower values than the standard as shown in Table 54.

Table 54. Anthropometric measurement of adult males (n=20)

Family No.	Index No.	Activity status	Height, cm	Weight, kg	BMI	Deviation from standard of 20-25**	Status	MUAC, cm	Deviation
1	1	HW	162.0	55	20.9	0	Normal	27.0	-2.3
2	2	HW	150.0	35	15.5	-4.5	CED III	25.2	-4.1
3	3	HW	158.0	48	19.2	-0.8	Low weight normal	23.0	-6.3
	38	SW	143.5	50	25.0	0	Normal	22.0	-7.3
4	4	HW	150.0	48	21.3	0	Normal	22.0	-6.5
5	5	HW	160.0	58	22.6	0	Normal	27.0	-2.3
6	6	HW	150.0	49	21.7	0	Normal	20.0	-9.3
7	7	HW	148.0	42	19.17	-0.8	Low weight normal	22.0	-7.3
8	8	HW	150.0	48	21.3	0	Normal	25.0	-4.3
9	9	HW	164.5	58	21.5	0	Normal	29.3	0
	17	MW	154.3	49	24.8	0	Normal	28.4	-0.9
10	10	HW	160.0	48	18.7	-1.3	Low weight normal	25.2	-4.1
	39	SW	164.0	45	16.7	-3.3	CED Grade II moderate	24.0	-5.3
11	11	HW	154.5	49	20.5	0	Normal	27.0	-2.3
	12	HW	154.7	60	25.0	0	Normal	28.0	-1.3
12	13	HW	153.0	58	24.7	0	Normal	29.0	-0.3
13	14	HW	167.0	52	18.6	-1.4	Low weight normal	22.0	-7.3
14	15	HW	150.0	49	21.7	0	Normal	22.7	-6.6
	40	SW	152.0	48	20.7	0	Normal	22.3	-7
15	16	HW	155.0	47	19.5	-0.5	Low weight normal	25.2	-4.1
Mean			155.6316	49.78947	20.74053			24.96316	-4.29474
SD			±5.790323	±6.088048	±2.536398			±2.756046	±2.714053

*(Source:Jellifee, 1966)

** (James *et al.*, (1988) ; Luizz *et al.*, (1992)

4.12.2 Anthropometric measurements of adult females

Data regarding the anthropometric measurements of adult females belonging to the 15 families are shown in Table 55. The age of these subjects ranged between 19 to 55. The height of these subjects varied from 139.0 to 166.0 cm (with a mean of 150.20 ± 7.48 cm), while the weight ranged from a minimum of 33 kg to a maximum of 78 kg (with a mean of 46.73 ± 9.98 kg).

The data on BMI of the subjects computed from weight and height data, varied from 16.61 to 31.41 (with a mean of 20.58 ± 3.30).

The BMI values when analysed showed that nine were normal. One noticeable fact in this table is that one female (index no.33) from family no.11 had a BMI value much above normal (31.4) who could be designated as obese grade II and six females from family no.3, 4, 8, 11 and 14 (index no.12, 23, 24,28,32 and 36) had BMI values below normal while two females had CED grade I (mild) from family no.10 and 13 index no.31 and 35. Another females from family no.1 and 10 with (index no.20 and 21) had CED of grade II (moderate) condition.

The data regarding the MUAC when analysed, varied from of 21.3 to 34.0 cm (mean 25.96 ± 3.38 cm). The MUAC of adult females varied from reference standard from a minimum of -0.5 cm to a maximum of +5.5 cm (with a mean of -2.5 ± 3.44 cm). Five subjects from family no.5, 7, 11 and 15 had MUAC values above normal. The rest had lower MUAC values.

4.12.3 Anthropometric measurements of adolescent males

Among the families surveyed, there were six adolescent boys and they belonged to family no.1 (two children) 8, 13 and 15. The height, weight and MUAC of these boys in comparison with reference standards are presented in Table 56. The age of the boys ranged between 12 to 16 years. The height of these children ranged from a minimum of 132.0 to a maximum of 162.0 cm (with a mean 148.14 ± 11.01).

Table 55. Anthropometric measurements of adult females (n=20)

Family No	Index No.	Age	Activity status	Height., cm	Weight, kg	BMI	Deviation from standard-20-25	Status	MUAC, cm	Deviation from standard-28.5
1	21	36	SW	159.0	42.0	16.61	-3.39	CED II Moderate	25.3	-3.2
2	22	38	SW	145.0	45.0	21.40	0	Normal	21.8	-6.7
3	18	40	MW	141.0	36.5	18.30	-1.7	Low weight normal	27.6	-0.9
	23	19	SW	152.0	45.0	19.48	-0.52	Low weight normal	27.3	-1.20
4	24	55	SW	144.5	41.0	19.70	-0.3	Low weight normal	25.0	-4.3
5	25	34	SW	154.0	50.0	21.00	0	Normal	29.5	1
	19	55	MW	150.0	47.0	20.80	0	Normal	28.0	0.5
6	26	38	SW	145.2	47.0	22.30	0	Normal	22.4	-6.1
7	27	58	SW	154.0	50.0	21.00	0	Normal	29.0	0.5
8	28	43	SW	148.5	42.0	19.10	-0.9	Low weight normal	24.1	-4.4
9	20	48	MW	154.3	49.0	20.90	0	Normal	25.5	-3
	29	20	SW	166.0	58.0	21.00	0	Normal	28.0	-0.5
10	30	48	SW	139.0	33.0	17.00	-3	CED Grade II Moderate	22.2	-6.3
	31	23	SW	161.0	45.0	17.30	-2.7	CED Grade I Mild	21.3	-7.2
11	32	28	SW	148.0	43.0	19.60	-0.4	Low weight normal	24.7	-3.8
	33	52	SW	157.5	78.0	31.40	+11.4	Obese grade II	34.0	+5.5
12	34	48	SW	150.0	56.0	24.80	0	Normal	28.0	-0.5
13	35	55	SW	140.0	35.0	17.80	-2.2	CED Grade I mild	21.5	-7
14	36	42	SW	143.3	40.5	19.80	-0.2	Low rate normal	26.0	-2.5
15	37	36	SW	153.5	50.0	21.30	0	Normal	29.5	1
				150.2	46.73684	20.58474	-0.17842		25.96842	-2.52105
				±7.482053	±9.986614	±3.304086	±3.036512		±3.386747	±3.445702

SW- Sedentary workers, MW-Moderate workers

** Jellifee (1966) *James *et al.* (1988), Luizz *et al.*, (1992)



Plate 3. Malnourished couples from family no.10 with index nos.30 and 10

Table 56. Anthropometric measurements of adolescent males (n=6)

Family No.	Index No.	Age	Height, cm	Reference standard	Deviation	Weight, kg	Reference standard	Deviation	MUAC, cm	**Reference standard	Deviation
1	48	12	141.5	149.7	-8.2	24	39.8	-15.8	17.4	21.2	-3.8
1	43	13	151.0	156.0	-5	31	45	-14	18.0	22.2	-4.2
6	44	14	162.0	163.1	-1.1	45	50.8	-5.8	22.3	23.2	-0.9
8	50	12	132.0	149.7	-17.7	33	39.8	-6.8	19.0	21.2	-2.2
13	41	16	162.0	173.5	-11.5	48	62.1	-14.1	20.2	26.0	-5.8
15	45	15	145.0	169.0	-24	43	56.7	-13.7	19.2	25.0	-5.8
Mean			148.1429		-13.6429	39.14286		-11.4057	19.72857		-4.28571
SD			± 1.01784		± 9.967423	± 9.822229		± 3.96479	± 1.88035		± 2.225929

Source : 50th percentile NCHS (1983)

** Jelliffee (1966)

The deviation of observed height from the reference standard varied from -1.1 to -24.0 cm (with a mean of -13.64 ± 9.96 cm).

The body weight of these subjects ranged from 24 kg to 48 kg (with a mean of 39.14 ± 9.82 kg). The weight of these subjects varied from standard weight by -5.8 to -15.8 kg with a mean of -11.40 ± 3.96 kg.

Analysis of MUAC values of these subjects revealed that it varied from 18.00 to 22.31 cm (with a mean of 19.7 ± 1.88 cm), while the deviation from standard varied from -0.9 cm to -5.8 cm with a mean of -4.28 ± 2.22 . When the height, weight and MUAC of the subjects were analysed it was surprising to note that adolescent boys had all these measurements below normal.

4.12.4 Anthropometric measurements of female adolescent

The composition of the families when assessed showed that there were four adolescent girls and they belonged to family no.5, 6 and 15.

Data presented in Table 57, discloses the fact that the height varied from 144.0 to 147.4 cm (with a mean of 147.4 ± 2.96 cm). The deviation of height from the standard varied by -5.5 to -14.4 cm (with a mean of -11.78 ± 4.38 cm).

It was clear from Table 57, all the subjects had height below normal.

The weight of the girls showed a wide variation with the minimum of 33.00 and maximum of 46.00 kg (with a mean of 43.4 ± 6.34 kg).

The deviation of weight from reference standard ranged from -13.7 to +3.9 kg with a mean of -7.07 ± 6.55 kg.

The data pertaining to MUAC of girls showed that, the minimum was 19.0 cm and the maximum was 26.0 cm (with a mean of 23.04 ± 3.48 cm). It varied from normal values by -1.2 to ± 3.37 cm.

When weight and MUAC were analysed, only one girl from family no. 6 had values higher than the reference standard, though her height was below normal.

Table 57. Anthropometric measurements of adolescence females (n=4)

Family No.	Index No.	Age	Height, cm	Standard	Deviation from standard	Weight, kg	Standard	Deviation from standard	MUAC, cm	Standard	Deviation from standard
5	51	12	146.0	151.5	-5.5	33	41.5	-8.5	21.0	21.5	-0.5
6	47	15	144.0	161.8	-17	46	53.7	-7.7	21.9	24.4	-2.5
6	46	13	147.0	157.1	-10	50	46.1	-3.9	26.0	22.4	3.6
15	42	16	148.0	162.4	-14.4	43	56.7	-13.7	19.0	24.7	-5.7
Mean			147.4		-11.78	43.4		-7.078	23.04		-1.2
SE			±2.966479		±4.380867	±6.348228		±6.559758	±3.488983		±3.370905

Source : 50th percentile NCHS (1983)

** Jellifee (1966)

4.12.5 Anthropometric measurements of female school going children (6-11 years)

Anthropometric measurements of female school going children in the age group of 6 to 11 years are presented in Table 58. There were four girls belonging to family no.2, 5 and 11 (two girls).

The data showed that the height of the girls varied from 107.0 to 145.5 cm (mean 122.5 ± 16.40 cm). The deviation of height from reference standard was found to vary from -7.6 to +1.9 cm (mean of -2.6 ± 4.6 cm). When the height of female children were taken into account, two children from family no.2 and 5 had values above normal.

The weight of the subjects varied from 15 to 31 kg (mean value 21.5 ± 6.75 kg). The deviation from the reference standard varied from -6.0 to +0.5 kg (mean -3.70 ± 2.87 kg). In the case of weight, the female child belonging to family no.2 had values above reference standard.

The details pertaining to the MUAC revealed that, it varied from 14.8 to 20.1 cm, with a mean of -17.07 ± 2.41 cm and it varied from reference standard from -0.5 to -2.5 cm (with a mean of -1.35 ± 0.96 cm) among the observed female children, and the values of all subjects were below normal.

4.12.6 Anthropometric measurements of male children (6-11 years of age)

The anthropometric measurements presented in Table 59, shows that the height of two male children in the age group of 6-11 years (who belonged to family no.2 and 8) were had 130.0 and 133.0 cm (with a mean of 131.5 ± 2.12 cm and the deviation from the standard varied by -4.5 to -7.5 cm (with a mean of -6.0 ± 2.12).

The data reveals that these two children had a height below normal.

The weight of these two male children were 25 and 38 kg (mean 31.5 ± 9.19 kg) and the standard values was 31.4 kg, since both were 10 years old. Hence the boy with index no.51 could be designated as over weight, while the other was wasted.

Table 58. Anthropometric measurements of female children 6-11 years (n=4)

Family No.	Index No.	Age	Height, cm	Standard	Deviation from standard	Weight, kg	Standard	Deviation from standard	MUAC, cm	Standard	Deviation from standard
2	54	6	116.5	114.6	+1.9	20	19.5	+0.5	15.5	17.3	-1.8
5	52	11	145.5	144.8	+0.7	31	37	-6.0	20.1	20.7	-0.6
11	55	6	107.0	114.6	-7.6	15	19.5	-4.5	14.8	17.3	-2.5
11	56	7	121.0	126.4	-5.4	20	24.8	-4.8	17.9	18.4	-0.5
Mean			122.5		-2.6	21.5		-3.7	17.075		-1.35
SE			± 16.4063		± 4.61808	± 6.757712		± 2.874022	± 2.414367		0.967815

Source : 50th percentile NCHS (1983)

** Jellifee (1966)

Table 59. Anthropometric measurements of male children 6-11 years of age (n=2)

Family No.	Index No.	Age	Height, cm	Standard	Deviation from standard	Weight, kg	Standard	Deviation from standard	MUAC, cm	Standard	Deviation from standard
2	49	10	133.0	137.5	-4.5	25.0	31.4	-6.4	20.0	19.7	+0.3
8	51	11	130.0	137.5	-7.5	38.0	31.4	6.6	18.2	19.7	-1.5
Mean			131.5		-6.0	31.5		0.1	19.1		-0.6
SE			±2.12132		±2.12132	±9.192388		±9.192388	±1.272792		±1.272792

Source : 50th percentile NCHS (1983)

** Jelliffee (1966)

The MUAC values of these children were 18.2 and 20.0 cm (mean 19.12 ± 1.27 cm). The deviation was +0.3 cm and -1.5 cm respectively. The child from family no.2 had MUAC value higher than the normal.

Overall analysis of the anthropometric data based on height and weight indicates that 35.00 per cent of adult males and 50.00 per cent of adult females were malnourished. Since their BMI was below 25.00. Out of these two males and four females could be marked as under nourished, since their BMI was found to be below 18.5 and these women belonged to family no.1, 10 and 13.

Among the 16 children surveyed, three children (two male children from family no.1 and 8) and one female child from family no.5 were wasted and one female child from family no.6 was stunted and only one female child from family no.2 is found to be normal. While out of 16 children 7 (43.75 %) males and 5 (31.25 %) female children were wasted and stunted.

Final analysis revealed that 75.00 per cent of children and 42.50 per cent of adults were malnourished, which indicates that out of 56 members, 17 were malnourished and the malnourished persons belonged to family no.1, 2, 3, 4, 7, 8, 10, 11, 13, 14 and 15.

4.13 CLINICAL EXAMINATIONS TO ASSESS NUTRITIONAL DEFICIENCY SYMPTOMS

A clinical examination of the family members, was carried out by a medical practitioner since Park and Park (1991) had observed that the ultimate objective of a clinical examination is to assess the levels of health of individuals in relation to food they consume.

The nutritional status of the family members were assessed through clinical examination; by a physician with the help of a schedule. The results obtained are presented in Table 60, which reveals distribution of family members with respect to the presence of nutritional deficiency symptoms.

Table 60. Distribution of family members with respect to nutritional syndromes

Sl. No.	Symptoms observed	Distribution of family members									
		Adult				Children				Total	
		Males		Females		Boys		Girls		No.	%
No.	%	No.	%	No.	%	No.	%	No.	%		
1	Discharge (eyes)/ watery, excessive, lachrymation	-	-	1	5	-	-	-	-	1	1
2	Lips/ angular stomatitis marked	-	-	1	5	-	-	-	-	1	1
3	Tongue / pale but coated	2	10	6	30	-	-	1	12	9	16
	Red	4	20	4	20	1	12	1	12	10	17
4	Gums / Bleeding and gingi vitis	-	-	-	-	-	-	1	12	1	1
5	Teeth (fluorosis)/ mottled and discoloured teeth	11	55	5	25	2	25	-	-	18	32
a.	Chalky teeth	1	5	-	-	-	-	-	-	1	1
b.	Caries / carries slight-	-	-	6	30	3	37	4	50	13	23
	Carries marked	-	-	1	5	-	-	-	-	1	1
6	Hair conditions										
	Loss of luster	6	30	2	10	1	12	2	25	11	19
	Discoloured and dry	1	5	9	45	-	-	6	75	16	28
	Sparse and brittle	-	-	3	15	-	-	1	12	4	7
7	Skin appearance										
a.	Loss of luster	4	20	2	10	-	-	-	-	6	10
	Dry and rough or crazy pavements	1	5	0	5	-	-	-	-	1	1
b.	Elasticity (skin)	1	5	1	5	-	-	-	-	2	3
	Wrinkled skin										
8	Face										
	Nasolabial seborrhea	1	5	1	5	-	-	-	-	2	3
	Symmetrical suborbit pigmentation	-	-	1	5	-	-	-	-	1	1
9	Alimentary system										
	Appetite / Anorexia	-	-	1	5	3	37	1	12	5	8

The data in general, revealed that only few members had some of the symptoms associated with certain deficiency disorders. The Table 60, reveals that mottling and discolouration of teeth was the major symptom observed among 19 (33.92 %) person, out of the 56 members examined. It was seen that eleven (55.00 %) adult males and six (30.00 %) adult females had exhibited this symptom along with two boys in the age group of 12 to 13 years. This symptom along with the chalky teeth observed in one adult male could be attributed to early symptoms of flurosis. Fourteen (25.00 %) members had caries lesions which can also be associated with fluoride deficiency or with poor oral hygiene or excess intake of sweets. The above two symptoms cannot be directly attributed to dietary deficiency but to fluoride deficiency or excess in soil or water.

Another conspicuous change that was seen 11 to 17 members. Was that of hair. While four members (7.00 %) exhibited sparse and brittle hair 17 (30.00 %) had discoloured and dry hair, and 11 (19.00 %) had lost natural colour of the hair. These symptoms as a whole were seen mainly in women and children. These changes can be attributed to protein deficiency (amino acid) or due to lack of hygiene or lack of time to take care of the hair.

Another symptom observed in 9 (16.00 %) out of 56 was the presence of pale and coated tongue and this was seen mostly in women seven out of ten. Moreover, ten members were also found to have reddish tongue which was found both in men and women to the same extent. These two changes may be due to iron deficiency or B-complex deficiency. The presence of B-complex deficiency among three members have been further confirmed by the presence of nasolabial seborrhea and angular stomatitis seen in one women. Changes in the skin was also observed among two to six members and this change was seen among adult men and women. These changes may be due to lack of essential fatty acids or decreased fat intake or to their exposure to hectic weather conditions to which they are exposed to during their work related to

agriculture. The data also revealed that one girl child too had bleeding gums and symptoms of gingivitis which could be due to vitamin C deficiency. Moreover, four children and one adult male had complaints of anorexia which can again be attributed to B-complex deficiency.

While examining the members the clinician was of the opinion that only around 28.00 per cent had an healthy appearance, while the remaining were rated as poor or fair as far as their general appearance was concerned.

As stated in the methodology, the clinical status of individual members were scored using the questionnaire suggested by ICMR, based on the clinical deficiency symptoms adjudged by the physician. The scores obtained by members of a family were summed up to arrive at the total family scores.

As indicated in the clinical schedule, a score of 'zero' was attached to a condition where there were no symptoms (no apparent deficiency) and the scores ranging from one to three were allotted to each item scored depending on the severity of condition. Using the schedule, if an individual exhibits all the symptoms in its most severe form that person would get a total score or maximum score of 67.

In the present study, when the individual subjects were scored, a score ranging from 0 to 12 out of 67 were comparatively seen among the population surveyed. Among the total population of 56 members, only four with index no.4, 5,17 and 12 had no symptoms of deficiency. They were from family no.4, 5, 7 and 11 respectively and they were adult male heavy workers and a male who was doing moderate work (from family no.9).

When the family status was assessed based on the scores obtained by individual members it was seen that, none of the family were free of clinical symptoms and the average family scores ranged from 1.1 to 8.2.

As far as the scores of these families were analysed, it was clear that family no.1 had the highest score of 8.2 and the lowest score of 1.1 was obtained by family no. 11.

Next to family no.1, family no.7 had secured a score of '8' while family no.4 and 5 had a similar score of '5'. But family no.8 and 13 had a score of '4' and the average score obtained by family no.2 was '6.7'.

The average clinical scores of family no.6, 10, 14 and 15 ranged from 4.2 to 4.5. While the score of 3.2 and 3.7 were secured by family no. 3 and 9 and the clinical score of family no.4 was 1.4.

The overall picture based on the clinical scores revealed that the most common clinical symptoms were pale but coated tongue, mottled and discoloured teeth, dental caries and hair changes (discoloured, dry, sparse and brittle hair).

4.14 HAEMOGLOBIN LEVEL

Though the subjects did not exhibit clearcut picture of anaemia except the presence of coated and pale tongue. The haemoglobin levels of adult members were estimated to confirm the presence of anaemia which was also used to assess the general nutritional status bio-chemically.

Table 61. Distribution of adult males and females according to their haemoglobin level

Haemoglobin levels, g/100 ml	Males		Females		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
≤ 12	0	0	7	35.00	7	17.50
12 – 13	19	95.00	13	65.00	32	80.00
15	1	5.00	-	-	1	2.50
Total	20	100.00	20	100.00	40	100.00

The data presented in Table 61, reveals that 80.00 per cent of the subjects (95.00 % of men and 65.00 of the females) had their haemoglobin value above 12 g/dl but below 14 g/dl. While only one adult male had 15 g/dl. The data clearly indicates that only seven women *ie.*, 17 per cent of the adult population surveyed were anaemic, having a value below 12 g/dl which is the cut-off value suggested by WHO for diagnosis of anaemia among adults.

4.15 NUTRITIONAL STATUS INDEX

Though the nutritional status of subjects were measured using weighment survey, anthropometry, clinical examination. A single yard stick that could measure the nutritional status of individual families comprising of persons having different age, sex and activity. A nutritional status index was worked out, for each of the families using height, weight, MUAC and clinical score of the respective family members using the formula detailed below.

Suppose X_{ij} be observation corresponding to j th variable for the i th sample, $w_j = 1/\sigma_j^2$, the weight assigned to the observation corresponding to j th variable, the nutritional status of i th individual is defined as

$$N_i = \frac{\sum_{j=1}^k W_j X_{ij}}{K} \quad i= 1,2,\dots,N$$

N = Number of family members

K =Number of variables

Table 62. Distribution of 15 families according to their nutritional status index

Family No.	Nutritional status index
1	11.51
2	10.22
3	10.74
4	10.91
5	10.27
6	10.66
7	12.32
8	9.94
9	12.14
10	11.58
11	10.29
12	12.36
13	10.37
14	10.81
15	10.80

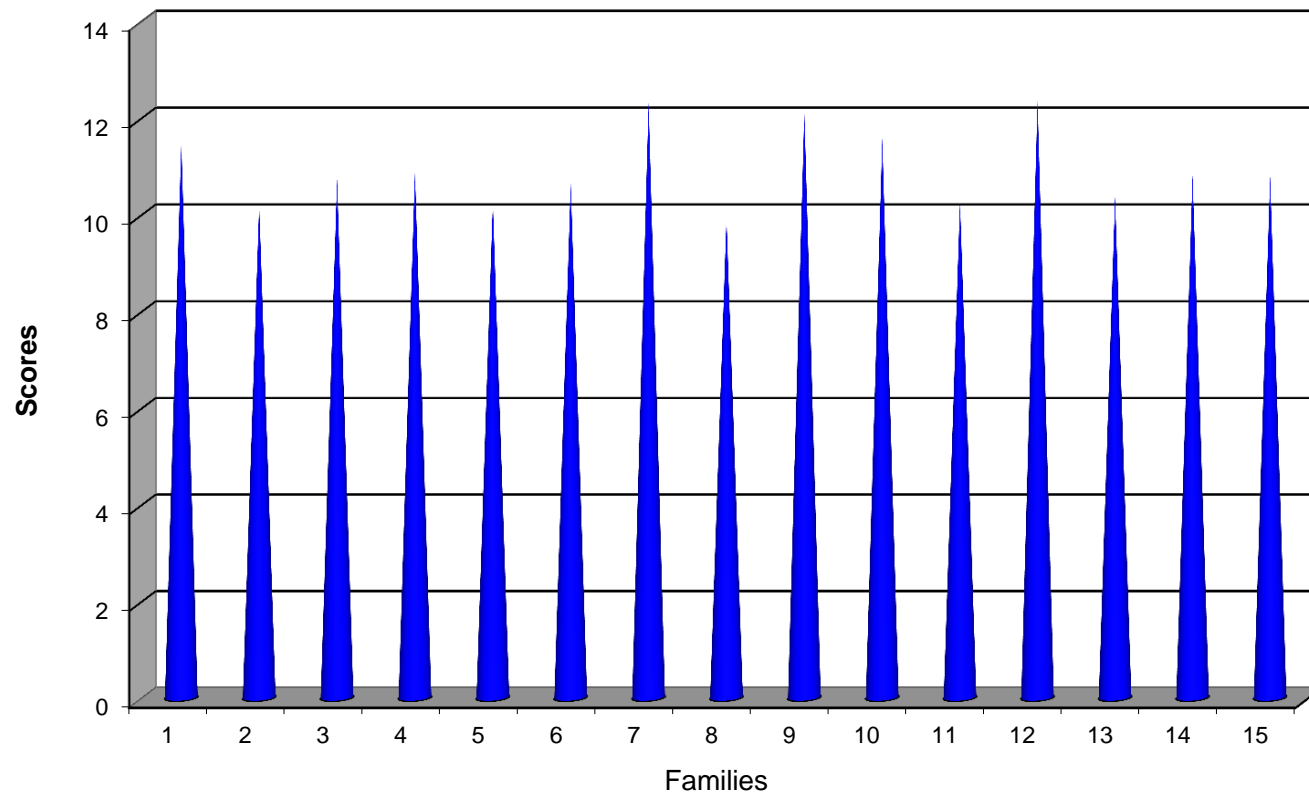


Fig. 4. NUTRITIONAL STATUS INDEX OF THE FAMILIES

The nutritional status index of the fifteen families were found and it ranges between 9.94 and 12.36. A comparatively high nutritional status index of ≥ 12 was seen for three families *viz.*, family nos.7, 9 and 12. Two of the families (family no.1 and 10) obtained a value of 11.58 and 11.51. Majority of the families (*ie.*, ten families) had an index score around ten (10.20 to 10.91) while family no.8 had the lowest index value of 9.94. Family no.12 had the highest score of 12.36.

When the data was further analysed to see whether the nutritional status of the subjects had been influenced by the quality of life. It was seen that, there was no significant association between nutritional status and RQLI ($r= 0.3356$).

4.16 MEASUREMENT OF HOUSEHOLD FOOD SECURITY USING SELECTED INDICATORS

The coping mechanism adopted by families to combat food insecurity were found out using the modified version of indicators used by Chung *et al.* (1999).

There were 30 indicators and the head of the family in the presence of an adult member was requested to state yes or no to each of the indicators read out to them in the form of a statement.

The statements were then scored. A statement with a positive answer would get a score of 'one' and that with a negative answer would get a score of 'zero'. Thus the total score, if all indicators are scored positively, will be '30' and if all are scored negatively the minimum score would be 'zero'. The higher the score the greater will be the extend of 'food insecurity'. The statements and the answers given by the respondents from the 15 families are presented in Appendix IX. The scores obtained based on the indicators as to applicable to each family when worked out showed that the highest score of 16 out of 30 was secured by family no.11. The next highest score of 14 was secured by 7 families *viz.*, family no.1, 2, 3, 5, 9, 12 and 15th family. Family no.6, 8,

10, 13 and 14th had a score of 14 while only two families *ie.*, family no.4 and 7th had the least score of 13.

The scores obtained for each family as shown in Appendix IX showed the measures these families had adopted to overcome food insecurity or to prevent insecurity. The total scores of these families ranged between a short interval of 13 and 16 which indicates that there was no much difference in the scores obtained between the families. However deviations were observed between one family and other, When the indicators resorted by each family to curtail food insecurity, were taken into account. Thus the score of family no.11 was taken into account (family that scored the highest value of 16) it was seen that, they had tried to overcome food insecurity through the factors like holding distress sale of valued assets such as jewellery, taking a high number of small loans from relatives, friends and shop keepers, relying heavily on wage work, substituting inferior quality vegetables, legumes or going without.

The next highest score of 15 were for family nos.1, 2, 3, 5, 9, 12 and 15 (7 families). The difference of score between these families and family no.11 is due to the fact that these families do not have a large family as in the case of family no.11 which also has the handicap of having few earning members, though all the above seven families had a score of 16, family no.9 and 12 differed in one respect as far as the individual indicators were concerned. These two families did not have school going children hence they did not have the enhanced expenditure on education of their children but, they were prone to food insecurity because they had provided dowries while marrying their girl children.

Family no. 6, 8, 10, 13 and 14 (5 families) had a score of 14 out of 30 and they had all the indicators shown by family no.11 except two factors *viz.*, they had small families and they had not provided dowries for marriage.

Families carrying serial no.4 and 7 had a score of 13 because they did not have the three hurdles such as spending money for dowries, no

expenditure on education of children, while they had a small family with just two members when compared to family no.11. Thus it was seen that a family with lesser score can be considered as comparatively food secure, or food insecure based on the 30 indicators developed in line with the suggestions of Chung *et al.* (1997). In this perspective no much variation could be observed between the families.

The scores based on selected indicators of household food insecurity status of the fifteen families are consolidated in Table 63. The data revealed that 100.00 per cent of the families had poor quality land or no land and they were taking out a number of small loans from informal sources such as neighbours, relatives and shopkeepers and were relying heavily on wage work, but none were found to accept attached labourer positions. It were also noted that, all the families purchased staple grains more than once a week and substituted inferior quality staple for the preferred quality ones. It was also observed that the families substituted inferior quality vegetables and legumes which would cost lesser than those of better quality and they also indicated that if these items are costly they would go without vegetables and legumes. It was also clear from the data that all the subjects (100.00 % of the families) were fulfilling obligations to relatives by buying gifts and were also celebrating religious holidays, which had drained off their cash resources.

While ten families (66.67 per cent) had held distress sale of valued assets such as jewellery, 60.00 per cent were found to spend considerable amounts for the education of their children. Two of the families (13.34 %) had spent huge amounts for providing dowries to their children. Family no.11 which is the only joint family having only few earning members stated that their large family size and under employment were the reasons for their poor food security.

It was interesting to note that none of the families had resorted to distress sale of livestock or other productive assets or assets such as land or house.

Table 63. Distribution of families based on indicators that measure food security

Indicators	Distribution of families	
	No.	Per cent
Owing poor quality land or no land	15	100
Holding distress sale of large livestock or small livestock	0	0
Holding distress sale of other productive assets	0	0
Holding distress sale of other valued assets such as Jewellery	10	66.67
Holding distress sale of other valued assets such as land	0	0
Holding distress sale of other valued assets such as house	0	0
Taking out a high number of small loans from informal sources neighbours	15	100
Taking out a high number of small loans from informal sources relatives	15	100
Taking out a high number of small loans from informal sources shopkeepers	15	100
Relying heavily on wage work	15	100
Accepting attached labour positions	0	0
Suffering physical disabilities	0	0
Suffering physical chronic illness	0	0
Having few income earners in large family	1	6.67
Purchasing staple grain more than once in a week	15	100
Migrating in search of work	0	0
Women who work for wages and have young children	0	0
Substituting inferior quality staple food for preferred quality	15	100
Substituting inferior quality vegetables	15	100
Substituting inferior quality legumes	15	100
Going without legumes	15	100
Going without vegetables	15	100
Substituting gruels for the main staple (to stretch consumption)	0	0
Providing dowries	2	13.34
Celebrating religious holidays	15	100
Buying gifts and fulfilling obligations to relatives	15	100
Repayment of consumption loan	0	0
Repayment of ancestral debt	0	0
Huge amount spend on the construction of building or house	0	0
Education of children	9	60.00

There were no families with women who work for wages having young children and no family had migrated in search of work. Another feature to note was that, there were no families with members who were suffering from physical disability or chronic illness, which has led to food insecurity.

None had spent their income in repayment of ancestral debt or consumption loans nor had spent huge amounts in construction of buildings or houses.

It was also gratifying to note, that none of the families had substituted gruels for the main staple (to stretch consumption).

4.17 ASSESSMENT OF HOUSEHOLD FOOD SECURITY USING FOOD SECURITY/HUNGER CORE MODULE OF USDA

USDA (2000) had formulated a Food Security Hunger Core Module for assessing the severity of hunger and food insecurity within individual homesteads. The questionnaire consisted of 18 questions such as ‘whether the families were worried their food would run out before they got money to buy more’ and ‘the food that bought did not last’. And ‘that they did not have money to buy more’.

The above questions or statements printed out in the form of a questionnaire was used to assess the reasons for food insecurity and to categorize the selected population into different levels of food security / insecurity coupled with or without hunger.

The questionnaire used for this purpose were presented in Appendix X. These statements were used to evaluate the food security of families having children or without children. Out of the 18 questions; 13 were put universally to all families, while the remaining six questions were directed only to families with children as suggested by USDA. These questions for families with children have been identified in the questionnaire with the letter ‘C’ in order to demark it from other general questions.

The questions were presented sequentially to the female head of the family in the presence of other members with special care to include or exclude those questions related to the children, depending on the presence or absence of children in that particular family. The response was marked in the appropriate column of the questionnaire.

Each of the families were rated based on their responses giving one point for each of the positive responses. The total scores for each family was worked out, which gives the 'total raw scores'. The raw score of households with children and without children were tabulated separately. The total scores obtained were then equated with the 'household scale score' suggested by USDA. These household's scale scores were then used to estimate the food security status category of the population surveyed. According to this categorization, families with household scale score of '0' was designated as 'food secure' or having 'low severity level' and those with 3.25 are in the 'threshold level'. Those who had values between 4.90 to 6.02 were called as 'food insecure without hunger' and those between 6.87 to 12.49 were referred to as 'food insecure with hunger'. Thus the households with or without children securing 'zero yes' responses would be called as 'food secure'. And those with 'one' and 'two yes' responses would be designated as 'food insecure without hunger' and families with children having 'yes responses' (raw scores) ranging from 'three to twelve' and households without children having 'raw scores' or 'yes responses' from 'three to seven' would be categorized as 'food insecure with hunger'.

The responses of the families for individual questions are presented in Appendix 10, and the responses of the families with respect to each statement were consolidated and are presented in Table 64.

Data presented in Table 64, reveals that in all families there were times when they could not afford to eat a balanced meal during the last 12 months even during the last 30 days and that they lost their weight, because of not enough money to purchase food. It was found that 14

Table 64. Distribution of households based on eighteen statements

Statements	Frequency	No. of households	Percent
1. "I/WE worried whether (my / our) food would run out before (I/WE) got money to but more". Was that often true, sometimes true, or never true for (you / your household) in the last 12 months ?	Some times true	14	93.33
2. "The food that (I/WE) bought just did not last, and (I/WE) did not have money to get more". Was that often, sometimes, or never true for (you / your household) in the last 30 days ?	Some times true	14	93.33
3. "(I/WE) could not afford to eat balanced meals". Was that often, sometimes, or never true for (you / your household) in the last 12 months?	Some times true	15	100
[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q5-6; OTHERWISE SKIP TO 1 ST -Level Screen] ★C 4. "(I/WE) relied on only a few kinds of low-cost food to feed (my / our) child / the children because (I/was / we/were) running out of money to buy food". Was that often, sometimes, or never true for (you/your household) in the last 12 months ?	Some times true	8	53.33
*C 5. "(I/we) could not feel (my/our) child / the children a balanced meal, because (I/we) could not afford that". Was that often, sometimes, or never true for (you / your household) in the last 12 months ?	Some times true	8	53.33
IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q7; OTHERWISE SKIP TO Q8] ★C 6. "My/ our child / the children were) not eating enough because (I/WE) just could not afford enough food". Was that often, sometimes, or never true for (you/your household) in the last 30 days ?	Some times true	8	53.33
7. In the last 12 months / 30 days, did you / other adults in your households (ever cut the size of your meals or skip meals because there was not enough money for food)		0	0
8. [IF YES ABOVE, ASK] How often did this happen- almost every month, some months but not every month, or in only 1 or two months?		0	0
9. In the last 30 days did you ever eat less than you felt you should because there was not enough money to buy food ?		0	0

Table 64. continued...

10. In the last 30 days were you every hungry but did not eat because you cannot afford enough food ?		0	0
11. In the last 30 days did you lose weight because you did not have enough money for food ?		15	100
12. In the last 30 days, did (you/you or other adults in your households) ever not eat for a whole day because there was not enough money for food ?		0	0
13. (IF YES ABOVE, ASK) How often did this happen-almost every month, some months but not every month, or in 1 or 2 months.		0	0
★C. 14 If children under 18 in the household ask 3-16. In the last 30 days since (current month) of last year, did you ever cut the size of (yes child's/any of the childrens) meals because there was not money for food ?		0	0
*C 15. In the last 30 days did (CHILD'S NAME / any of the children) ever skip meals because there was not enough money for food ?		0	0
16. [IF YES ABOVE, ASK] How often did this happen-almost every month, some months but not every month or in one or two months ?		0	0
17. In the last 30 days (was your child/were the children) ever hungry but you just could not afford more food ?		0	0
18. In the last 30 days, did (your child/ any of the children) ever not eat for a whole day because there was not enough money for food ?		0	0

*C-indicates questions if children are present in the family

(93.33 %) of the families were worried whether their food would run out before they got money to buy more. They also reported that this situation had occurred only some times in these families in the last 12 months.

For 93.33 per cent of the families, 'the food that they bought did not last' and 'they did not have money to get more'. These two statements were sometimes true for the fourteen families.

The survey further revealed that of eight families (53.33 %) had fed their children with low cost foods because they were running out of money to buy food. This statement was 'sometimes true' for these households in the last 12 months, while a similar number of families reported that 'they could not feed their children a balanced meal' and this statement was sometimes true in the last 12 months. In these eight families the children were not eating enough because they could not afford enough food and this statement was 'sometimes true' in the last 12 months.

It was surprising to note that among the fifteen families surveyed none of the adults or children ever had to cut the size of the meals or skip meals and none in these families had to remain hungry for a whole day due to lack of money to purchase food.

Food security/hunger core module scores for the fifteen families were then worked out. The data revealed that eight families *viz.* family no. 1, 2, 5, 6, 8, 11, 13 and 15 had secured a raw score of 'fifteen' which was equivalent to USDA score of 12.49. These were the families with children. While the family no. 3, 4, 7, 10, 12 and 14 had a score of 'eight' which was equivalent to USDA score of 10.85. These were the families without children. Only family no.9 had a score of two which was equivalent to the USDA score of 6.02. This family also did not have children.

Table 65. Food security status score of the households

No. of households with children	No. of households with no children	No. of 'yes' response (raw scores)	USDA score equivalent	Food security status category
8 (family no.1, 2, 5, 6, 8, 11, 13 and 15)		15	12.49	Food insecure with hunger
	6 (family no.3, 4, 7, 10, 12 and 14)	8	10.85	Food insecure with hunger
	1 (family no.9)	2	6.02	Food insecure without hunger

Details pertaining to the data presented in Table 65, revealed that all families except family no.9 were found to be 'food insecure' and they also had hunger which was evident. It was seen that the presence or absence of children was not found to influence the food security of these families.

4.18 FOOD SECURITY INDEX

Though the Food Security / Hunger Core Module of USDA has been acclaimed as a good model for assessing food security. Its application under Indian conditions has its own handicaps. Hence food security index for the 15 families under focus was developed using ten selected parameters such as number of risk factors present in the family. RQLI of the family, total ACU of the family, number of earning members in the family, family size, average monthly income of the family, average monthly expenditure on food, average monthly expenditure on non food items, amount spent on repayment of loans and average energy intake of the family. These factors were selected based on the basis of facts collected from literature which gave an indication that these would affect food security of family.

The food security index was computed using the above ten parameters. Each family was classified as low, medium or high based on the actual value for each of the parameters. A score of 1, 2 and 3 respectively were assigned for low, medium and high of each of the

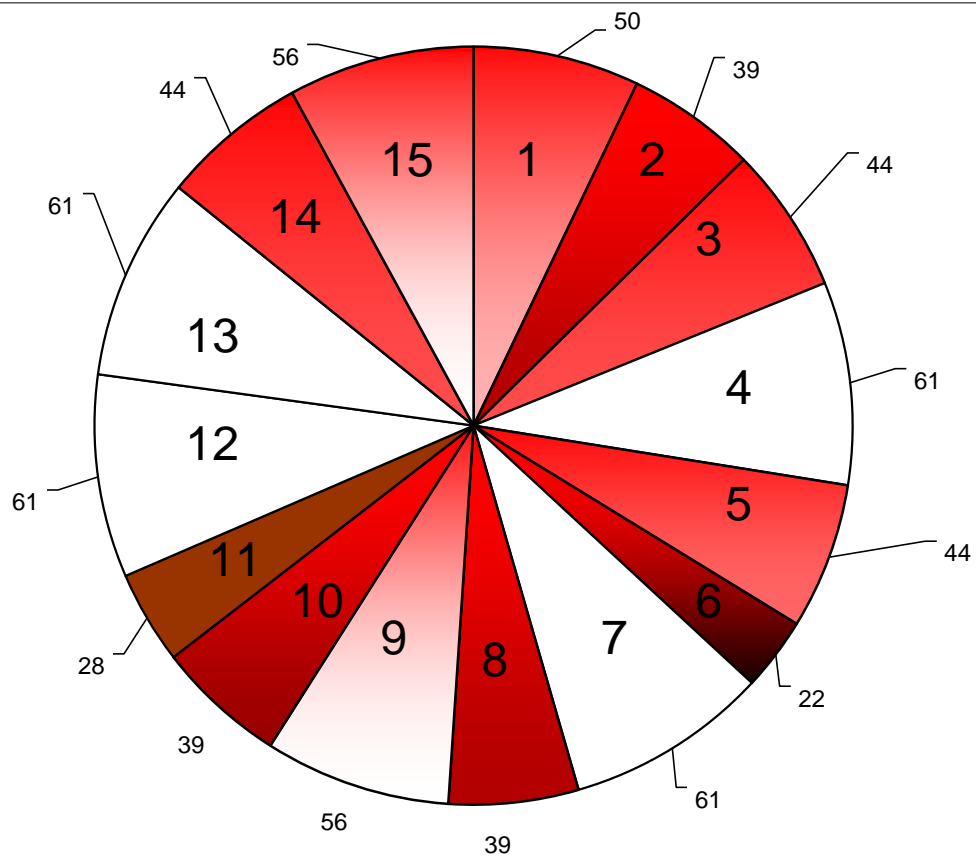


Fig. 5. FOOD SECURITY INDEX OF THE FAMILIES

parameters for every family. These scores were then summed up and then standardized to get final food security index.

The food security index of individual families thus developed are presented in Table 66.

Table 66. Food security index of the families

Family no.	Food security index
1	50
2	39
3	44
4	61
5	44
6	22
7	61
8	39
9	56
10	39
11	28
12	61
13	61
14	44
15	56

As shown in table the food security index of the 15 families were found to range from 22 to 61. The lowest value of '22' was for 'family no.6' while the highest value of '61' was seen shared by four families (family no.4, 7, 12 and 13). Hence based on the food security index developed, these four families could be rated as the ones which have a 'better food security' when compared to the remaining families. Family no.6. was found to have the lowest index of '22', indicating a poor food security status. Based on the index developed an attempt was further made to group the families into four categories based on their food security status as shown in Table 67.

Table 67. Distribution of families according to their food security level

Food security level	Distribution of families
Good (75-100)	NIL
Fair (74-50)	7 (1,4,7,9,12,13,15)
Poor (49-25)	7(2,3,5,8,10,11,14)
Very poor (≤ 24)	1 (6)



Plate 4. Family with highest food security score (family no.12)



Plate 5. Most food insecure family (family no.6)

This categorization has led to the conclusion that seven families (family no.1, 4, 7, 9, 12, 13, and 15) have a fair level of food security while the remaining eight families have food insecurity of varying degrees, with family no.6 having the highest level of food insecurity.

The food security index as well as the USDA scores reveals the fact that none of the families were food secure and family no.6 has the highest levels of food insecurity, when assessed by both the methods.

Table 68. Correlation of different socio-economic variables with food security index

Socio-economic variables	Food security index
Earning members	0
Monthly income	-.08945 ^{NS}
Family size	-.80509**
Amount spend on food	-.35059 ^{NS}
Total adult consumption unit	-.76117**
Calorie amount	0.57076*
No. of risk factors	-.11600 ^{NS}
Expenditure on non food items	-.54369**
Repayment of debt	-.07318 ^{NS}

Significant difference at 5 % level

**Negative correlation

*Positive correlation

An attempt was made further to find out the causes of food insecurity. As shown in Table 68, a significant positive correlation was observed between the level of food security and the energy intake of the subjects. However a negative correlation was observed between food security and variables such as family size, total adult consumption unit and expenditure on non food items. However there was no correlation between food security and family income, monthly expenditure on food, presence of risk factors and among spent on repayment of debt, and number of earning members in the family.

Further, an attempt was taken to find out whether the level of food security was influenced by the quality of life, the data revealed that there is no association between food security and RQLI ($r= 0.0638$).

As food security is related to food intake and therefore is closely associated with nutritional status of the individuals. The analysis of the

data confirmed the fact that the nutritional status of the members reflects the food security of the family; since these two are found to be positively and significantly correlated with each other ($r=0.5262$).

Though except family no.6 and 7 had opined that they feel that they do not suffer from food insecurity. But none were found to have optimum level of food security when assessed by their food availability, food access and utilization pattern when assessed by food purchase inventory, food intake survey and nutritional status assessment. As stated by few of the families the reasons for poor food security were found to be borrowing money (taking several small loans from informal sector), relying heavily on wage work, casual employment and under employment, compulsion to spent large amounts on childrens education purchasing gifts and celebrating religious holidays, and payment of dowry for the marriage of grown up children. The investigators found that lack of nutritional education as well as ability to make the best use of the available resource have been the two major reasons in addition to the reasons stated above which has dragged these families into food insecurity. The coping mechanisms adopted by these families to overcome food insecurity were purchasing inferior quality staples, vegetables and legumes for preferred quality ones and avoidance of costly food items and reducing the number of items in a meal.

Discussion

5. DISCUSSION

Glancing through the history of India, the pre and immediate post independent era seems to give emphasis initially to the concept of 'freedom from hunger' followed by 'health for all' as slogans of development. Attempts to prevent hunger was mainly oriented to increase food production which resulted in the concerted movement of 'green revolution' which subsequently paved way to 'blue' 'white' and now to 'rainbow' revolutions. Such exercises no doubt has made India into a land of food surplus especially with reference to cereals, milk, vegetables and fruits. Despite of such progress, hunger and malnutrition persisted among a visible segment of the population, especially those belonging to low socio economic group. The health for all campaigns attempted towards the last part of the 20th century no doubt had made remarkable impressions in the total health scenario of the country resulting in reduced infant mortality, increased longevity and reduced prevalence and spread of communicable diseases. However, under nutrition and malnutrition have remained as a threat to development and lack of 'access to food' and 'hidden hunger' have been found to corrode not only the health and nutritional status of the people but their physical stature, mental capacity and ultimately their working efficiency. This realization has led to the bear truth that food production or health care development traversing parallelly would not ensure human resource development to its full potential. This has helped to concretise the concept of 'food security' because, as stated by Swaminathan (2001) 'there exists a paradox, were huge levels of child and maternal malnutrition and micronutrient deficiency co-exists with high levels of food supply'. Though India is a food surplus country, that maintains a surplus buffer stock, even after exporting food commodities, it is reported to have the largest absolute number of malnourished people in the world. This has make the issue that India is facing no longer simply 'food insecurity' based on food

availability but 'food and nutrition insecurity' based on the lack of access to a diet of high nutritional quality.

In the light of the above realization, the present study was carried out to assess 'the extent of food security enjoyed by landless agricultural labourers of Kalliyoor Panchayat' in the form of a case study covering fifteen families, where at least one member had taken up agriculture as the main source of his income. In an attempt to evaluate the food security enjoyed by these families, surveys were conducted to assess the socio-economic status, dietary pattern, food purchase and use habits and nutritional status assessment were carried out. The results obtained from this study are discussed in this chapter.

The 15 families selected from Kalliyoor panchayat, a rural area, belonging to Nemom block of Trivandrum district, had a population of 56 members. A sizeable majority of the subjects under focus (*ie.*, 73.33 %) belong to scheduled caste communities of Hindu religion, while only one family (*ie.*, family no.1) belonged to forward community. Several studies have revealed that people belonging to deprived sections of the society are more prone to hunger, malnutrition and therefore to food and nutrition insecurity.

MSSRF (2000) conducted a study among the scheduled tribe populations in the states of Orissa and Madhya Pradesh and found that scheduled tribes who had historically dependent up on natural forest products for food in the seasons when crops are not cultivated, their conditions of these population has worsened with the depletion and degradation of forests. Foods are neither available nor affordable to them. Hence malnutrition and starvation occur specially during droughts.

Being nuclear type, the families under the present study in general had a size of '3.7' which gives an indication that they have a small size when compared to the general family size norm of Kerala or that of India. It is an advantage as far as the percapita availability

of goods and services to the families which may positively influence their quality of life as well as nutritional status.

Deshpande *et al.* (1999) conducted survey in four near by villages of Bhopal by dividing the families into five classes based on their land holdings and found that the average family size of the landless farmers was '6.78'.

A study based on the nutritional status of women engaged in the coir industry done by Ranganathan (1996) among two hundred women of Chirayinkal Taluk of Thiruvananthapuram district revealed that in the nuclear families, the per capita income as well as the per capita availability of food and other resources was higher than the joint families.

Another special feature which may enhance the food security of the families other than the small size could be the absence of children below five years and those above the age of 60. This is because Andres *et al.* (1994) reported that older age is a vulnerable age from the nutritional point of view; nutritional deficiencies are frequent and their consequences are serious. Chronic diseases are common in elderly and might contribute to poor health and malnutrition.

UNICEF (2001) has further reported that from the nutrition stand point the most vulnerable segments of the population are infants and young children; malnutrition in these groups belonging to the poor socio-economic classes is a major public health problem (the main cause of malnutrition in India includes non availability of foods, poverty, population growth, customs and traditions, socio-economic variables like caste, religion, level of education and influence of industrialization, urbanization and modernization as explained by Soman and Rajasree (1994).

Another feature which may boost food security is reported to be access to income. Food access depends on access to income and regular employment as observed by Anthony and Chatterjee (1999). Among the

working population, the primary source of income would be their employment. If employment could guarantee food security, it is gratifying to note that 67.5 per cent of the universal population of 56 were employed. Another matter of solace is that among the males aged above 21, all except one *ie.*, 95.00 per cent were employed and the one who is not employed is pursuing his education. Studies have also indicated that the presence of female earners could be an added asset to improve the nutritional status ensuring greater food and nutrition security. In the present study, it was noted that out of 20 adult females 8 (40.00 %) were employed and they belonged to family nos.3, 4, 5, 9, 10, 12 and 13. Family no.10 in that case, would be doubly benefited from this factor, because it has two female earners.

Nathawat and Mathur (1993) reported that employed women secure higher scores for general health, life satisfaction and self esteem. Increase in women's income is translated more directly into better health and nutrition of their children. In Kerala also women's employment is found to benefit the working women themselves and their families, since the income generated would increase the purchasing power and standard of living with consequent improvement of nutritional status.

This being the brighter side of the issue of employment, the darker side could not be ignored. When the socio-economic profile was analysed, only 60.00 per cent of the families had employment for six months in an year. The gravity of the problem of underemployment was clearly evident from the fact that 46.00 per cent of the families had employment for eight to twelve days in a month. Further the data revealed that the 'lean' periods of employment in a year varied from two to ten months, when the subjects hardly had any employment. The 'season' also seems to play a role during such periods in deciding the days of employment. Thus though 76.00 per cent are employed, about 50.00 per cent are under employed

being casual labourers and this may pull down the food security of these families. In this context the view of Mahendradev (1997) may be recalled. He ascertained that household income is determined by the productive resources it commands, which may include land, but always includes labour. Raising the productivity of household members and increasing employment opportunities are direct means of raising household income and therefore household food availability.

Moreover, along with food security, the nature of employment can also deter the nutritional security of the subjects mainly because, out of the 19 adult males who were employed, 16 were heavy workers. Heavy workers as per nutritional norms require more nutrients and larger supply of foods in order to maintain good health and better nutritional status. This is essential to ensure their working efficiency as well as to enable them to gather more days of employment so as to harness a good income. Such a virtuous cycle gets broken when a heavy worker does not get enough days of employment or adequate income to procure and consume enough amount of food which will ultimately lead to food insecurity.

Unni and Jeemol (1997) are of the opinion that daily status unemployment rate is correlated with the head count ratio of poverty. The poor will take up whatever work they get. They cannot afford to remain unemployed, as they need to earn money that allows them to buy enough food for sustenance. Some times when labour is exploited, the labourers are over worked for small wages. Then there will be very little unemployment and widespread poverty. The higher the existence of casual employment, larger will be the risk of being out of employment and the risk of transient food access and food insecurity, as rightly pointed out by the above authors.

Among the subjects majority of the female members (42.50 %) had sedentary level of activity and their demands were lesser when compared to the three women with index no.18, 19, 20 from families 3,

5 and 9 who were moderate workers. Women are generally proclaimed as vulnerable to nutritional and health disorders and may succumb to food and nutritional insecurity if they were heavy workers. A study conducted by Paul and Harold (1993) among women in Ghana and Africa showed that the physically demanding work performed by these women has a significantly negative effect on their nutritional status. Ottesen *et al.* (1994) reported that the heavy work load among women may lead to poor diet because there will be less time for preparation, and cooking and their meal frequencies have been reported to be reduced thus effecting their food and nutritional security.

The nature (heavy, moderate and sedentary work) and period of employment also was found to depend up on the type of employment which the members resorted to. Out of 19 male workers, there were a few (29.00 %) who had taken up agriculture related activities as well as non-agricultural activities (25.00 %) like loading and construction work especially during lean seasons. Out of these nineteen workers, sixteen were found to be heavy workers. The two who were categorized as sedentary workers one male, who is a moderate worker had non-agriculture type of work such as 'tuition/clerical work' and they had more days of employment when compared the others. A paradox observed with respect to the nature of employment was that though majority are engaged in the agriculture, the produce they make do not reach the family to strengthen their food security.

Jayanthakumari (1993) had conducted a study on the food consumption pattern of agricultural families in Thiruvananthapuram district and she reported that though the utilisation of farm produce by the farm families varied with the size of their land holding; the families having higher land holdings, utilized the produce such as vegetables and green leafy vegetables fully at home while the labourers whose land holding size was below 25 cents, their utilization of farm

produce was very low. She also found that the fruits produced are fully utilized by majority of the families irrespective of the size of land holdings.

Several reports have acclaimed that poverty alleviation and income generation go hand in hand for improving nutritional status as well as food security. Though all the males were employed, 60.00 per cent of the families had annual income below Rs.30500/-. It was further noticed that five (33.35 %) families could be categorized as 'BPL' since their annual income was below Rs.22000/- as declared by government of India. On the other side of the income spectrum, two families (13.33 %) had an income of around one lakh and these families had a better purchasing power and hence availability and access to food which can ameliorate food insecurity.

Sanauer (1990) after reviewing the factors concerning household behaviour on food consumption and nutrition found that income, price changes, agricultural commercialisation, household economics and education determined the intrahousehold allocation of food and there by the nutritional status of the population.

Katherine (1995) reported that dietary inadequacy was seen among low-income households leading to micronutrient deficiencies more among rural elderly. Low income affects the purchasing power and this inturn affects their food security thus limiting food choices and leading to malnutrition.

Tucker and Rush (1992) had reported that low income is related to low dietary diversity that would lead to low nutrient intake.

However, several incidences have proven the fact that income alone does not guarantee a good standard of living or food adequacy since these factors are controlled by the expenditure pattern of the families. In other terms, the family budget and the resource management procedure within the family is expected to lead to better food security. Deshpande *et al.* (1999) announced that the monthly expenditure on

various foods and non-foods items increased as the monthly income of family increased except for the expenditure on protective foods consumed by landless and marginal farmers. The protective foods described included foods like pulses, vegetables, fruits, milk and milk products.

The results obtained as presented in Table 11, revealed that eight families (53.33 %) had a negative family budget *ie.*, income being lesser than the expenditure; such event if prolonged could push these eight families (1, 2, 3, 6, 7, 8, 13 and 15) into food insecurity. Angel's law ascertains that as the income increases, the percentage of income spent on food decreases. A similar picture was noted in the present study also. However, it was noted that those families which had a low income had low expenditure on food which can be taken as an abnormal observation controversial to the general rule. These families except (family no.7) had a higher expenditure on non-food items when compared to food expenditure. This can be one reason for precipitating food insecurity among these families. Analysis of the data on expenditure of the families had clearly indicated a negative but significant correlation between food security index ($r=0.54369$) and the expenditure on non-food items, though the income as such was found to have no significant association with the family food security ($r=-0.08945$). A study conducted by NIN (1985) revealed that in low income groups over 90.00 per cent of the family income is used up for providing the essentials such as food, clothing and shelter. According to Devadas (1991), in Tamil Nadu a maximum proportion of the income (61.80 %) was spent on food by families of low socio-economic strata.

In a study conducted by Kaur and Mann (1994) among low socio-economic group families of Punjab, similar results were reported where in the major item of expenditure was food.

Another controversial phenomena observed in the present study was that family no.9, 10 and 14 who had a saving (expenditure being lower

than the income) were not engaged in agriculture. The annual food expenditure of these three families was below 45.00 per cent *ie.*, they spent lesser amount of income on food.

Another controversial feature observed was that all the 15 families had one or other form of saving though their expenditure was more than the income. Such families had pointed out that the negative balance shown in their budget was partially due to their saving habit, because each family saved at least Rs.50/- every month. They had also declared that they were forced to borrow money also because of this saving habit.

The importance they gave for giving better education to their children was also said to be responsible for borrowing money. It was further observed that the better housing conditions that prevails among the families has also led to borrowing along with the expenditure incurred for payment of dowries. A Special feature of mention is that 33.00 per cent of the families had borrowed money for purchasing food also. This borrowing habit could be one of the deciding factors, which would determine their food security.

Ranganathan (1996) conducted a study among coir workers and reported that maximum number of families borrowed money to meet daily household expenditure and Perumal (1986) had observed that the income or wage obtained by the coir workers is insufficient to maintain their family and quite often they had to resort to borrowing from others to tide over their family expenditure. A similar situation was noted among the families under focus. Though some of the families borrowed money to meet the food expenditure, it was seen that ten (66.66 %) out of 15 families had leased out land varying from 9 to 49 cents entirely used for cultivation of crops such as banana, amaranthus, cucumber, lady's finger and string beans. If the families can make use of at least part of their produce to go in to their family food basket, it could definitely enhance the food security as well as the nutritional status and

the health condition of such families. This is specially so because, all the families had reported hike in prices of goods as the most important economic problem faced by them. As agricultural labourers if they could siphon-out at least part of the produce or if they can cultivate simple crops like vegetables in their backyard, the household food security could be improved. This fact has been endorsed by Seshadri (1993) who reported that home produced foods would influence the consumption pattern of the families. The present study observed that costly foods like milk, egg and coconut produced at home are not fully utilized by the households.

The study by Talukdar (2000) conducted since twelve years in Bangladesh, Nepal and Cambodia covering over 9 lakh households confirmed that home gardening plays an important role in the control of night blindness and children in households with developed gardens consumed green leafy vegetables and yellow fruits more frequently than children in the households without a garden. This evaluation demonstrated that the homestead food production has an impact on reducing micro nutrient malnutrition through increasing the availability and consumption of micro nutrient rich foods which improves the nutritional status of families.

The socio-economic survey has revealed that education of children demands a lot of money which otherwise could be used for improving their diet. However, such an alternate method does not give fruitful results which is sustainable, because children's education is necessary to ensure their life security in the long run. It was also noted that medical expenses incurred by family no.3 and 7 might have affected the purchasing power of these two families. For existence specially noticed among five families (33.33 %) also has a deterrent effect on the food security of these families. Living in Katcha houses which creates unhygienic living conditions as well as recurring expenditure on maintenance especially

of roof can be identified as a direct as well as in direct cause of poor health, malnutrition and that of food insecurity.

As indicated earlier, lack of permanent employment for casual wage labour, which creates untimely economic depression in the household itself, could be stated as the prime problem suffered by 86.00 per cent of the families that could push them in to food insecurity.

Economic status and standard of living are prime factors which are expected to determine food security. According to Arora (1991) income is an important indicator of the social and economic status of an individual. The family income determines the family status and socio-economic strata of the society to which they belong.

NNMB (1997) had conducted a study among landless agricultural labourers and found that the intake of cereals and millets of landless agricultural labourers and cultivators were above the RDA. There appeared to be a decrease in cereal intake with better occupational status. The consumption of income elastic foods like milk and milk products, fats and oils, sugar and jaggery was higher in the households with occupations like business, services.

In order to find out this relationship among the subjects under focus, an attempt was made to assess the quality of rural life enjoyed by the selected families.

Dhanasekharan (1991) had used socio-economic measures of quality of life as an alternative approach for measuring rural poverty. The same yardstick was used here in order to find out the quality of life based on socio-economic indicators in order to see whether, poverty was responsible for food insecurity. This analysis revealed that only two families (family no.2 and 7) could be categorized as 'poor'. This fact has been further proven by examining the income of these families. It was found that both family no.2 and 7 were 'BPL' families since their annual income was Rs.10,500/- and Rs.15,000/-. Among the socio-economic indicators, which were measured, principal component

analysis revealed that lack of female earners, high percentage of income being spent on food and poor housing were the characteristics which has led these families into 'poverty' and poor quality of life. Lack of female wage earners has been reported to curtail family resources significantly as reported by Paul and Harold (1993) which can lead to food insecurity. Poor family housing which paves way to poor household sanitation can effect assimilation which is the third dimension of food security as reported by Swaminathan (2001).

Based on Angel's law of consumption, the high expenditure on food (as percentage of income) itself is an indicator of poverty. At the same time whether such high percentage of expenditure on food could ensure food security is questionable. When the food security of two poor families (family no.2 and 7) were examined; it was surprising to note that RQLI value and food security index of these families varied.

It was seen that, while family no.2 had a food security index (39) and RQLI value of 27 while family no.7 had a food security index (61) and RQLI value of 37. However statistical analysis of the data on RQLI and food security index of the families revealed that there was no association between RQLI and FSI ($r = 0.0638$).

Attempt was also made in the study to find out whether the families are 'at risk of poverty'; using a risk factor analysis suggested by Srilatha and Gopinathan (1991) applicable to Kerala condition. This analysis revealed that five families (family nos.4, 5, 7, 8 and 11) were 'at risk', since they had more than four risk factors out of nine. The food security index of these families varied significantly and hence these factors alone could not be taken as determinants that modifies food security. Further when association between risk factors and food security index was considered no significant relationship could be established between the two ($r = -0.11600$).

MSSRF (2001) had reported that a person who is not healthy cannot assimilate food and one's state of health depends upon

sanitation, hygiene and the surroundings in which he lives. However three major risk factors such as communal backwardness lack of access to safe drinking water and alcoholism can deter nutritional status. The two later mentioned factors especially can drastically reduce food assimilation, which can lead to nutrition insecurity.

Gomez (1990) had reported that alcohol consumption and smoking have a direct effect on appetite, inhibiting desire for food, their by limiting intake of nutrients. The present study revealed that 30.00 per cent of the subjects had the habit of consuming alcohol regularly and 75.00 per cent were smokers and 60.00 per cent were addicted to betal chewing.

According to Ramankutty *et al.* (1993) information on aspects such as smoking, alcohol use and tobacco chewing should be deemed as important as they are one of the contributory causes to a number of chronic and fatal diseases. It was also noticed from the data collected that the subjects were spending an amount of Rs.50/- to 840/- every month which was found to drain their income. This if diverted to procure food can definitely improve the food security of these families.

The socio-economic parameters, personal characteristics so far explained are variables, which can directly or indirectly affect food security. However, it is the actual diet and the quantity of that consumed as well as its quality which would directly have an impact on nutritional security. With this concept, a diet survey and a food purchase inventory were conducted to study the availability of food and a food inventory survey along with the 'weightment survey' were done to assess the 'access to food'. The third dimension of food security namely assimilation or utilization of food which would ensure complete food security was assessed through anthropometry, clinical examination and measurement of haemoglobin levels of the subjects.

The general dietary survey conducted on the families reveled that all families and its members were non-vegetarians who had followed a

dietary pattern inherited from their forefathers. Their diet primarily consisted of cereals, other vegetables, roots and fish, since they constituted the most frequently purchased and used items: green leafy vegetables, fruits, pulses, meat, jaggery and egg were identified as less frequently used items. An enquiry on the actual meal pattern revealed that the diet consisted of a cereal preparation forming the major constituent of three meals, with lunch consisting of cooked rice and tapioca served with fish curry and another vegetable preparation. Lunch was the major meal of the day; the leftover of which was used as dinner. Tapioca constituted an essential ingredient of the lunch. Jayanthakumari (1993) reported that the diet of agricultural labourers was being based on rice, fish, tapioca and coconut. Ranganathan (1996) reported that the diet of coir workers were found to predominate in cereals. This is the replica of the general dietary pattern of Keralites belonging to low socio-economic groups which is ill-balanced. The consumption of tubers (tapioca) and fish were high and the diets of these households were found to be uniformly low in protective foods like pulses, vegetables, milk and fruits. The above finding is similar to the one reported by Issac (1990) who observed an inadequate dietary intake among the coir workers of Kerala and that rice and tapioca with fish featured in the diets frequently. According to him their diets were devoid of meat, eggs, fruits, milk and vegetables.

The family food purchase and use pattern varied from one to another over a wide range. The food inventory conducted over two months revealed that family no.7 and 12, the variation could be attributed to their small family size and their ACU was 2.4. However, it was noted that these two families do not purchase neither pulses nor green leafy vegetables at all, which would affect the quality of their diet. Moreover, these two families had a lower expenditure on food compared to others. It was noted that family no. 7 had higher food expenditure (Rs. 930/-), when compared to non-food

items (Rs.810/-). They were found to spend 75.00 per cent of their income on food, and their expenditure could be curtailed if they had purchased more of green leafy vegetables which are low cost items of food. However this family seems to have a overall budget which is negative when income and expenditure were compared, even though the family has only two adult members. Such a family when it expands have chances to become food insecure. This family was one, which had an additional expenditure due to illness for medical expenses. The head of the family was found to suffer from fever, asthma and cough which has kept him away from job, and it had brought down the family income too. This is a typical example of illness leading to malnutrition through a vicious cycle, of absenteeism from work, low income, low purchasing power and consequent malnutrition as explained in the National Nutrition Policy (1991).

Analysis of the purchase inventory with respect to availability per person as well as per consumption unit revealed that there was excess availability of roots and tubers as well as fish in all the families and at the same time, there existed an inadequacy with respect to pulses, leafy vegetables, oils and milk. This pattern itself creates an imbalance in the dietary pattern, which was further magnified when the weighing survey was conducted. The net result indicated that as far as 'availability', one of the primary determinants of food security, was concerned none of the families were found to purchase or consume adequate quantities of even the essential components of a balanced diet. This calls for the need for nutrition education and dissemination of information on procuring balanced diet from available resources. Though food purchase inventory gives data on availability to food to the families, it gives no insight with respect to 'access' that each family member has to the available food, which is another parameter that ensures food security. To arrive at this the weighing survey conducted twice in these families, brought out considerable variation between the data collected through inventory and that recorded from actual

weighment. Here again variation existed between different families with respect to adequacy of different foods required to formulate a balanced diet, which is clearly indicated in Table 26 and 27. The result indicated that all had an excess intake of roots and tubers and fleshy foods. Majority of the families had deficient intake of cereals (above 50.00 but below 74.00 per cent inadequacy). Inadequacies to a level of 50.00 to 100.00 per cent was observed with respect to leafy vegetables (10 families), fruits (10 families), milk and milk products (14 families) oils and fats, sugar and jaggery (15 families).

Over all deficiency in food intake was also seen from the fact that 12 families out of 15 were able to meet only 50.00 to 75.00 per cent of their cereal requirement, though it was found to be partially substituted by roots and tubers consumed in excess. The net review also points out that none of the families consume a balanced diet. This finding need not be taken as an isolate invention because the data presented by NNMB (2000), while comparing average consumption of different food stuffs consumed by 6408 families in Kerala through repeat survey conducted over a period of 20 years from 1975 to 1995 have found that “the average consumption of cereals and millets was marginally lower than the RDA while that of pulses and legumes was about half the RDA. The intake of green leafy vegetables and fats and oils was less than one-fourth of RDA; while that of other vegetables was satisfactory. There was considerable improvement in the consumption of milk and milk products, fats and oils and sugar and jaggery over the years”.

Among the families, family nos.10, 15, seemed to be less food insecure compared to others when access was measured by weighment survey conducted among individual members of the families while concerted efforts are required by family nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13 and 14 to improve their food security.

Though food is necessary to satisfy the emotional and social requirements of man, from the nutritional point of view, food is also required to meet the supply of different nutrients that are required either to provide energy or to build up the body or to maintain and repair the tissues or to regulate body processes. In order to maintain the homeostasis of the body the nutrients are to be supplied in amounts recommended for healthy living. Hence the nutrient content and adequacy of the diet consumed by the families and individuals of each family were computed and the results revealed that majority of the families (11 out of 15) had an excess intake of protein and those four families which showed a negative deviation from RDA had very low deficit ranging from 4.00 to 3.00 per cent which need not be taken as an inadequacy because, RDA's usually include a dosage which is above the average; this can be attributed to the excess intake of fish, which is a unanimous feature observed in all the families. A feature noted in these households is that they would purchase fish everyday setting apart an amount specially for this purpose. Depending up on the cost and type of the fish, the quantity purchased will always be greater than the amount required by the family. Kalliyoor is a panchayat which has a fresh water lagoon in its vicinity which provides fish in plenty in all seasons at a lower price. As indicated in the procurement survey, the fish that they purchased were sardine, 'anchovi' and 'tuna' which are comparatively cheap. Moreover, the women who purchased fish would go to the market daily to collect the cheapest fish available on a day-to-day basis. The preference, availability and access of fish has made this item as an essential and unavoidable item of daily diet which no doubt has contributed to protein in take above the requirement by the members of these families.

Shah *et al.* (1993) reported that the diets of families in Kerala had rice as the major source of calorie and over 77.00 per cent consumed

fish daily. It was noted that the diet consisted of high quality protein foods or high amounts of protein.

The calorie intake also seemed to be adequate to almost all families except family no.3 and 11 which had only 79.00 and 82.00 per cent of the requirement met from the diet. However, four families had an excess intake of calories. While evaluating adequacy of diet, it is generally assumed that if the diet supplies adequate amount of protein and calories, the requirement of other nutrients will be taken care of. This rule of the thumb does not hold good in this study. In the present study six to eight families out of 15 had deficient intake of fat, calcium, iron, vitamin A, thiamine, riboflavin and vitamin C to a level below 75 per cent of adequacy. Two important nutrients found to be deficient in these groups of families were vitamin A and riboflavin. The study indicates that like in other places, micronutrient deficiency especially that of Vitamin A and ascorbic acid is widely prevalent among this group of subjects also. Laisamma (1992) found that when compared to the male agricultural labourers, the female agricultural labourers were found to consume lesser quantity of food items like cereals, vegetables, fruits, nuts, oil seeds, sugar and jaggery and animal foods and so the diet of these women were poor in retinol ascorbic acid, thiamine, riboflavin and iron.

Sujatha (1990) revealed that most of the women engaged in stone breaking in Kerala had diets that were inadequate in all the food articles except roots and tubers and fish. Their diets were found to be deficient in retinol, iron, thiamine, riboflavin, niacin and vitamin C.

NNMB (1997) had conducted a study in Kerala and found that the consumption of protein, energy and iron was marginally lower, while that of vitamin C was more than the RDA. The intake of vitamin A and riboflavin was about a third and half of RDA respectively.

The deficiency in vitamin A and riboflavin could be attributed to inadequate intake of leafy vegetables, roots and tubers other than

tapioca, fruits and milk as shown in Table 26 and 27, which had indicated that these food stuffs are taken to a level which is just adequate to meet 8.00 to 40.00 per cent of the micronutrient demand. The inadequacy shown in vitamin A and C, could also be attributed to negligence in the intake of raw fruits and vegetable also.

In the present study, 'family' has been used as the unit to assess food security being a case study. The family concept has no existence without the members who constitute the family. The family size and the composition, decides the per capita availability or availability of foods and nutrients per consumption unit, also determines the nutrition security of the family as a whole and that of the individual members, since Khan *et al.* (1994) reported that increased family size is reported to have an adverse effect on the nutritional status of every member of the household.

The characteristic features of individual members such as age, sex and activity were used to compute ACU. The ACU differs from family to family and it was seen that the ACU of families under focus varied from 2.4 to 6.1 which affects the food security of the family when viewed in the light of family income or per capita income. The per capita income varied over a wide range as also the monthly income. However analysis of the data revealed that the income was found to have no significant influence on food security index of the families ($r = -.08945$). However, it was seen that the family size and the A.C.U. of the families had a significant but negative correlation with the food security index. This fact is shown in Table 67, which indicates that family no. 11 which had a family size of six and ACU of 6.1 had the lowest food security index. And family no. 4, 7, and 12, which had a small size of two members each and with the ACU of 2.4 each had a food security index of 61.

Suryanarayana (1997) had reported that in nuclear families, the per capita availability of food and other resources would be higher than

that of joint families and hence small family norm is likely to influence their dietary habits and nutritional status and this is true in the present study also.

However, Gayathri (2002) conducted a study on nutritional status and vitamin A profile of lacto vegetarians and found that the social factors *viz.*, family size was found to have no influence on vitamin A level of the subjects examined by her.

As the composition of the family has an important role in fixing the ACU and nutritional requirement, the individual food and nutrient adequacy of each member in a family was calculated from the weighment data. Moreover, the total population were divided in to various segments based on their sex and activity to identify the weak-links in the household food security system. The results indicated that heavy workers (13 out of 16) consumed excess amounts of roots and four (25.00 %) had an excess in take of green leafy vegetables too; while they all had inadequacies of most of the food materials including cereals. However, this does not seem to reflect in their nutrient intake, since two had deficient intake of energy and they were from family no.1 and 3. However they had deficient intake of riboflavin and vitamin C, because 75.00 to 87.00 per cent had supplies below 55.00 per cent of adequacy. This imbalance could be due to lesser intake of milk, milk products and fresh fruits and vegetables. In this case, the calorie intake of heavy workers seems to be adequate because of excess intake of roots and tubers intake as well as higher intake of fat by 75.00 per cent of the subjects.

This dietary adequacy in also seen to reflect in their anthropometric measurements; especially the BMI; 62.50 per cent were normal, and only one subject from family no.2 was found to suffer from severe chronic energy deficiency (CED III), while others had slightly lower weight and could be classified as 'low weight normal' (family nos.3, 7, 10, 13 and 15). The CED candidate belonged to family no.2

and his family was found to have 'the lowest RQLI' a 'low food security index', lowest income and highest percentage of income being spent on non-food items (which itself was greater than their average monthly income) and they had only a moderate nutritional status. Hence it was seen that the social circumstances in which a person lives seems to contribute considerably to his poor nutritional status and his family has only one earning member and he is engaged in heavy work.

Their iron status seems to be good as reflected by their haemoglobin level which ranged between 12 to 15 g/dl. This is a factor which is sure to give them better working efficiency and which would go a long way in deciding their nutrition security.

Those who had a 'low-normal weight' were from families of 'middle level RQLI', though their food security index seemed to be good. This is so because; no association could be identified with RQLI and Food Security Index and between RQLI and nutritional status index ($r=0.3356$).

However Mohapatra *et al.* (1996) conducted a study among rural Oriya women from drought affected and Kalahandi district of Orissa and found that more than 52.20 per cent of Kalahandi women showed various grades of CED. The prevalence of malnutrition in mild (CED grade I), moderate (CED grade II) and severe (CED grade III) was 31.10, 14.80, 6.30 per cent respectively. Women belonging to normal group was found to be 47.50 per cent and a negligible proportion of women were overweight.

When the adult moderate workers were examined, none had an adequate intake of nutrients except protein (in the case of only one female from family no.5). The gender difference in inadequacy was clearly seen between the males and females in this group as the women had greater inadequacy than men.

The sedentary workers constituting 50.00 per cent of the adults (three males and 17 females) were found to have an inadequate supply of

most of the nutrients. However as far as the two major nutrients were concerned (protein and energy) the women seemed to be better than man because 82.00 per cent of the females had excess calorie intake and about 25.00 per cent had more than adequate intake of protein while 50.00 per cent had excessive intake of fat also. However, it was seen that, the most deficient nutrients here again was vitamin A and riboflavin though two subjects with index no.30 and 34 had excess intake of retinol and in the case of male workers, fat deficiency was also observed to a significant level.

In the case of females there seems to be an excess intake of calorie, protein and fat. When they were engaged in sedentary type of activity, there is a chance for them to develop obesity also. Studies done in Venganoor block of Thiruvananthapuram by Ukkuru (1999) showed that 15.83 per cent of the women were obese. Similar findings have also been reported by “Health action by people”, Thiruvananthapuram independent research organization, of Kerala who reported that there is an increase in the level of obesity among women in Kerala.

From the activity stand point, among the subjects most of the women are sedentary, while except four, all males are heavy workers. Hence a gender difference in health status is observed between male and female who are equal in number as far as the demographic distribution is concerned.

Among the females on the basis of BMI, 45.00 per cent were normal when compared to males (65 %). The poor nutritional status among the women was also revealed from the fact that four women were suffering from CED of mild and moderate type. Another distinguishing factor was that except one women from family no.11 none of the participants of the study were found to be obese (grade II). This particular women belonged to family no.11 which had a positive economic background with good amount of savings and moderately

high RQLI. But this women was found to poor food security index. This contradictory indication reveals once again, that there is no correlation between RQLI and NSI and also between RQLI and FSI.

However, further analysis of the antropometric data does not point out higher chances for obesity since, four were having chronic energy deficiency of grade I and II another six were 'low weight normal'.

Hence the extra energy that these women consumed at present could help them to boost up their body weight and hence this discrepancy in the diet need not be taken as a deterring fact. On the other hand it had a favourable effect for the time being in enhancing their nutritional status.

The over all picture shows that the male heavy workers and the female sedentary workers have a better dietary intake than sedentary males and moderate heavy workers (male and female).

As far as children were concerned, the diets of adolescents between 16 and 18 were found to be most deficient in riboflavin, thiamine and vitamin C as observed in the general dietary pattern of the families. Moreover the diet consumed by the girls seems to be poorer than that of the boys, but the boys had a lower intake of iron and calcium when compared to his requirement. This particular difference in these two nutrients could be because, the requirement of boys are greater than that of the girls.

Seshadri (1993) had conducted a study among labour families of Thiruvananthapuram with special reference to nutritional status of adolescent children and found that the diet of adolescent girls were deficient in protein (33.74 %), fat (8.89 %), energy (6.58 %), calcium (55.89 %), iron (40.3 %), riboflavin (32.5 %) and vitamin C (4.7 %) and the nutrient intake of adolescent boys revealed that their diets were deficient in protein (28.9 %) energy (15.7 %), calcium (37.34 %), iron (36.43 %) and riboflavin (63.3 %). The result of this study matches well with the present study.

As far as the school going children of 13-15 year old were concerned, the diet of the entire group seemed to be deficient in all the nutrients except protein in the case of one male (index no.46) and one female child (index no.45); though calorie inadequacy was more among boys than girls. NNMB (1990) studies in Thiruvananthapuram had also revealed that the diets of school going children were deficient in almost all nutrients.

This fact is confirmed from the fact that only one female child (index no.54) from family no.2 was found to have a normal growth in the light of anthropometric measurements which is reported to be the simplest yardstick for measurement of nutritional status. The data has further revealed that other than this child all are found to be stunted and wasted. One child with index no.46 from family no.6 was found to be stunted alone while another child from family no.5 was found to be wasted. This gives a grim picture, which needs careful attention. Studies done all over the world have indicated that children are the most vulnerable segments of population and their nutrition if neglected will affect the nutritional status; work efficiency, intellectual capacity as well as mental makeup of the adult citizens of tomorrow. Hence concentrated efforts needs to be taken to improve the food security of the families because that will ensure better development of children of these families ultimately. The children belonging to 10 to 12 years were also found to have a deficient nutrient intake except protein and calories. However, vitamin A is observed to be the most deficient item followed by riboflavin.

Children in the age group of 4 to 9 constituted 28.57 per cent and their diet seems to be deficient in all nutrients including calories except in the case of one child (7-9 year old) who had on adequate intake of energy alone.

The above findings opens a window to one of the main observation that school going children of these families were

consuming a diet deficient in almost all nutrients and hence they are the most vulnerable group among the different groups of family members. Being young and as subjects who require special attention, they deserve better care from their parents, to ensure better growth and development. Encouraging these children to participate in the school lunch programme would help them to improve their nutrition and this might also help to reduce the burden of these families.

The study ultimately revealed the fact that with reference to access, availability and utilization, all the families are found to be 'food insecure' since, most of the families have poor access and availability, though the purchasing power and RQLI of these families are at a 'moderate level' as none of them could be designated as "very poor" as per the classification done by Dhanasekharan (1991).

The dietary picture has further revealed poor access, poor availability of foods and therefore of different nutrients by all the families except protein which has resulted in poor nutritional status among 85.00 percent of the adults and 93.00 per cent of children. They are all found to suffer from varying degrees of malnutrition as exhibited by poor nutritional status. In this study, a positive association was observed between nutritional status and food security index which indicates that lack of food security has directly influenced the nutritional status index of the subjects ($r=0.5262$) by low body weight, height and MUAC values of the most subjects when compared to reference standards. However they did not exhibit clinically signs of deficiency, though few had chronic energy deficiency. When the food security was measured using indicators that may lead to lack of availability and access to food, it was seen that none of the families had an optimum index value, since the food security index value ranged from 22 to 61 out of a total of hundred.

When measured with the yardstick suggested by USDA all the families except family no.9 were identified to suffer from food

insecurity with evident hunger, which confirms the poor food insecurity prevalent among the families surveyed.

But, the most recent food security survey in USA had revealed that 89.30 per cent of American households were 'food secure' throughout the calendar year 2001. The remaining 10.70 per cent of US households (11.5 million) were 'food insecure' (USDA, 2000). These households were unable to acquire enough food to meet the needs of all their members because they had insufficient money or other resources. In the present study, the level of food insecurity can be attributed to poor access and poor availability which may be due to poor income, high total family expenditure coupled with poor nutritional knowledge because many do not know how to balance their diet. This imbalance is seen from the fact that they purchased more fish and roots and tubers at the expense of low cost nutritious items such as green leafy vegetables, other vegetables and pulses. It was also seen that, even those from better income families are affected by low weight, wasting and stunting which indicated that income alone is not a factor that determines food access and availability. Monthly income was found to have no association with food security ($r=-0.08945$). The other factors which affects utilization also need to be taken in to account.

Here again no association could be identified between RQLI and food security and between RQLI and nutritional status which have to be taken for granted that, along with availability and access, the utilization need to be improved. As most of the families follow simple cooking procedures there is no chance for the nutrients to be lost but this once again calls for the fact that balancing in purchase and formulation of a balanced diet suited for the entire family with special emphasis to meet the requirements of children, is needed. Hence education on these lines need to be imparted to these subjects. Apart from this, modalities to enhance their income, employment opportunities, utilization of lean periods of employment through subsidiary occupation, better selection

of foods, improved planning in the organisation the household diet, ensuring adequate intake by the members are to be adopted to improve the food security of this population. Keeping the men away from alcoholism and from smoking can also go a long way with reducing the family expenditure and improving their general health. Inducting the women into productive employment may also be taken as a measure to improve the nutrition security of these families.

In short, the study has revealed that the food security of these families are all found to be poor and all are suffering from hunger combined with poor food security with or without hunger which is due to, reduced access, availability and utilization. Based on the study, children seems to be the ultimate victims of food insecurity. The problem of food insecurity among these families need to be taken as a serious problem and measures to improve food production at household level needs to be encouraged along with nutrition and health education.

Summary

6. SUMMARY

An investigation to assess the extent of household food security of selected fifteen families of landless agricultural labourers residing in Kalliyoor panchayat was undertaken in the form of a case study.

The household food security was assessed through an enumeration of nature and quantum of different foods purchased and used by these families as a means to assess availability as well as access; while the utilization was investigated through measurement of nutritional status of the subjects. The two procedures done to predict the availability, access and assimilation of food which determines the household food security were repeated twice with an interval of three months to estimate the ability of the households to sustain the type of food security or insecurity prevailing in their households. A trial was also conducted to match the results obtained through the above analysis with food security analysis model suggested by USDA. The coping mechanisms adopted by the families to enhance food security or to overcome food insecurity were also evaluated by adopting the indicators suggested by Chung *et al.* (1997) duly modified to suit the study. As household food security is reported to be associated with the environment and situation in which these families reside, the socio-economic conditions of the families, personal characteristics of the members of the family, as well as the physical quality of their life were also ascertained. The presence of family risk factors were identified with a view to understand whether such factors have any role in deciding household food security.

The socio-economic survey revealed that 73.00 per cent of the subjects belonged to scheduled caste communities of Hindu religion. Except one all families were of a nuclear type with an average family size of 3.7. An advantage noted in these families was that out of the 56 members, only 28.57 per cent were children which reduces the dependency ratio as well as the vulnerability of the families. Moreover, 48.21 per cent

were employed and seven families had women earners in addition to employed male members. However, 80.00 per cent of the men were heavy workers demanding better nutrition from the family pot.

A feature which may boost food security is reported to be access to income. Among the working population, the primary source of income would be their employment. In this study 67.50 per cent were employed. As far as the nature of employment was concerned, though their main occupation was agriculture, there were a few who had taken up agriculture related activities as well as non-agricultural activities.

While the monthly income of the families varied from Rs.1050/- to 8180/-, on an average 50.00 per cent of the families were found to have a deficit family budget. Moreover the food expenditure was found to exceed the non-food expenditure among 20.00 per cent of the families. This variation in income was due to under employment, since 46.00 per cent had employment only for eight to twelve days in a month (being casual agricultural labourers). Though the habit of saving was noticed as an inherent feature of all the families, it was a paradox that 66.66 per cent are in the grip of debt due to the routine procedure of borrowing money in order to make both ends meet. Eighty six per cent of the families also reported economic crisis emerging out of under employment, and hike in prices of goods and repayment of loans taken for maintenance of the house. Households with children (60.00 %) had the problem of heavy expenditure on their education too. These problems were found to aggravate food insecurity in some of these families.

Though cultivators of vegetables on leased lands, this feature seems to have no direct effect on the household food security except facilitating on a hike in income.

Though only five families were reported to belong to BPL category, the quality of life of these families when assessed using an Rural Quality Life Index (RQLI) yard stick suggested by Dhanasekharan (1991) all except family no.2 and 7 were found to be 'non poor'. However no

association was found between food security status and RQLI of these families ($r=0.0638$).

Food being the direct component that decides household food security, the food availability and access data collected through food purchase inventory of one month duration revealed that all families were not purchasing or procuring food needed to meet their requirement based on the recommended allowances for a balanced diet suggested by ICMR. The per-capita availability as well as availability based on consumption unit (CU) revealed that the quantity procured was insufficient to meet the requirements of a balanced diet by all the families, which can be taken as an indicator of 'food insecurity'.

The access to food when further analysed through weighment survey, the data revealed that none of the families were consuming an adequate diet required to maintain neither the food security nor the nutritional status. The per capita availability of foods as well as nutrients were found to be inadequate and the inadequacy for different foods and nutrients varied over a wide range making an intrafamily comparison difficult. However the diet consumed by all the families were ill-balanced because all were found to consume an excess amount of fleshy foods (fish) and roots and tubers 20 to 40 times above RDA. High preference easy availability and low cost of these substances as well as an affinity for tapioca and fish in general can be accounted for this major observation.

Moreover, all the households had deficit consumption of pulses, leafy vegetables, fats and oils, sugar and jaggery, fruits, milk and milk products which can be categorized under 'energy giving' and 'protective foods'. Despite of an excess consumption of roots and fleshy foods especially (fish), when the energy and protein adequacy of the families were computed only two families (family no.10 and 14) had both calorie and protein adequacy. It was further noticed that 13.33 per cent of the families had protein adequacy, while they were deficient in calories and 26.66 per cent exhibited a reverse picture with calorie adequacy coupled

with protein inadequacy. However only one family (family no.13) had both calorie and protein inadequacy.

A visible inadequacy with respect to vitamin A and riboflavin was noticed among 90.00 per cent of the population surveyed, while 33.33 per cent had ascorbic acid and fat deficiency respectively. Their diets were not effective to meet even 50.00 per cent of the requirement.

When the dietary data was further analysed with respect to adequacy of nutrient intake of family members, categorized into different levels based on physical activity it was seen that the sedentary females of these families had a comparatively better intake followed by the heavy workers. The children seemed to be the worst hit group. The girl child (children) of these families were found to consume a poorer diet when compared to boys indicating a sex based difference. However, the food distribution pattern followed by the families as revealed by diet survey does not indicate sex wise discrimination neither in food allocation nor in feeding and care of female children. Hence, this difference in adequacy could be attributed to reduced consumption by individual children though the availability and access to food to these children were equal.

Several studies have revealed that access and availability of food alone does not cater to food security, since the assimilation or utilization plays an important role in determining the level of food security among the households and with in the members of the household. This third dimension of food security *viz.*, 'assimilation' when assessed through nutritional status evaluation of the subjects measured by anthropometry, clinical examination and haemoglobin estimation of the members of these families, it was observed that only 28.00 per cent of the entire population was found to be optimally nourished based on anthropometric data. Here again, the children seemed to be the most affected ones, because only one child had normal height for weight for age and height for age among the 16 children examined. While one child was found to be 'stunted' and another was 'wasted' the remaining 81.00 per cent were found to be

wasted and stunted. Sex wise analysis of the data again proved that there were no difference between boys and girls. Since no significant variation could be observed in degree of malnourishment among boys and girls.

Among the 40 adults only 55.00 per cent were found to be normal based on anthropometry. Further sex wise analysis at the data revealed that 45.00 per cent of the women were normal and 65.00 per cent of the men were normal. This indicates that the men were better nourished than women, which indeed is the well known situation that prevails in India, especially among the poor.

However drastic forms of under nutrition was not a significant phenomena of these families since only 15.00 per cent had chronic energy deficiency. Contrary to the earlier observation of more women having normal BMI than men, it was noted that 20.00 per cent of the females were suffering from chronic energy deficiency, while only 10.00 per cent of the malnourished men had chronic energy deficiency.

As observed in NNMB surveys conducted in India among different population groups, the incidence of deficiency symptoms indicating clinical forms of nutrient deficiency disorders was not observed to a significant level among the subjects of this study also. However mild forms of B-complex deficiency and mottling of teeth and dental caries (which could be associated with fluoride imbalance) were noticed among 17.00 to 23.00 per cent of the subjects when clinically examined.

Another salient observation was that anaemia is seen mostly among 37.00 per cent of adult females whose haemoglobin level is less than 12 g/dl as per a cut off level suggested by WHO. While 60.00 per cent of the women had a haemoglobin level between 12 and 14 g/dl while 100.00 per cent of the men had it between 12 to 15 g/dl indicating a better iron status. This could be due to higher availability of iron from the food which was found to contain excess amount of fish, though their diet was deficient in green leafy vegetables.

Overall analysis of nutritional status of the individuals revealed that there was no significant difference between the fifteen families. Ultimately when nutritional status index was developed, it was confirmed that there was no much difference between the families since the index values ranged between 9.9 and 12.3.

With the help of indicators which are found to food availability, access and utilization of different families, 'food security index' of different families when computed revealed the fact that none could be designated as 'food secure', since the values ranged from 61 to 22 against a total index value of 100.

The lowest food security index of '22' was for family no.6 and the highest value of food security index was observed for three families viz. family no.4, 7 and 12.

When categorized into different levels of food security based on the index value 46.66 per cent of families were found to have a 'fair' level of food security. Another seven were found to have a 'poor status' while family no. 6 was identified as the 'most food insecure family'.

When the household food security was again measured using the food security hunger core module of USDA, it was seen that none of the families were 'food secure'. This finding confirms the result obtained from the present study. According to this yardstick all were found to suffer from food insecurity combined with hunger, while family no.9 was identified as a family 'with food insecurity without hunger'.

Further analysis of the results obtained from the study revealed that the food security index, was influenced by the nutritional status of the family members or vice versa. It was also found to be positively correlated to the calorie of the subject, but negatively related to the family size and expenditure on non food items (including alcohol consumption) as well as the total ACU of the family. However the food security level was not found to be influenced neither by their quality of life (RQLI) as

well as by the number of earning members in the family, nor their monthly income, or the number and type of risk factors that they have.

The major causes of food insecurity among the families surveyed were, absence of land for cultivation, spending huge amounts for education of children or for providing dowry for grown up children as well as lack of nutrition education, and inability to make use of available resources to improve their level of food security.

Most of the families were trying to maintain their level of food security through simple coping mechanisms such as, taking frequent small loans from non-formal sources, relying heavily on wage work, substituting inferior quality or low cost of staples, legumes and vegetables or going without them.

In summary the study revealed that none of the families have optimum level of food security when evaluated through food availability, access and nutritional status of the members of these families.

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*Originals not seen

**EXTENT OF HOUSEHOLD FOOD SECURITY OF SELECTED
FAMILIES OF LANDLESS AGRICULTURAL LABOURERS OF
KALLIYOOR PANCHAYAT-A CASE STUDY**

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ABSTRACT

An investigation to assess the extent of household food security of selected fifteen families of landless agricultural labourers residing in Kalliyoor panchayat was undertaken in the form of a case study.

The household food security was assessed through an enumeration of nature and quantities of foods purchased and used by these families as a means to assess availability as well as access, while the utilization was investigated through measurement of nutritional status of the subjects.

A trial was also conducted to match the results obtained through the above analysis with food security analysis model suggested by USDA. The coping mechanisms adopted by these families to enhance food security or to overcome food insecurity were also evaluated adopting the indicators suggested by Chung *et al.* (1997) were suitably modified. As household food security is reported to be associated with the environment and situation in which these families reside, the social and economic conditions of the families, personal characteristics of the members of the families as well as the physical quality of their life were also enumerated. The presence of family risk factors were also identified with a view to understand whether such factors have any role in deciding household food security.

The socio-economic survey revealed that 73.00 per cent of the subjects belonged to scheduled caste communities of Hindu religion. Except one, all families were of a nuclear type with an average family size of 3.7.

Though only five families were reported to belong to BPL category the quality of life of these families when assessed using a 'Rural Quality Life Index' yardstick suggested by Dhanasekharan (1991), all except family no.2 and 7 were found to be non-poor. However no association was found between food security status and RQLI of these families ($r=0.0638$).

Food being the direct component that decides household food security, the food availability and access data collected through, food purchase inventory surveys of one month duration, each revealed that

except family no.9 others were not purchasing or procuring enough food needed to meet their requirement based on the recommended allowances for a balanced diet as suggested by Indian Council of Medical Research.

The access to food when further analysed through weighment survey, confirmed the fact that none of the families were consuming an adequate diet required to maintain neither the food security nor nutritional status. The diet consumed by all the families were ill balanced, because they were found to consume an excess amount of fleshy foods (fish) and roots and tubers (about 20 to 40 times above RDA), coupled with a deficit intake of pulses, leafy vegetables, fats and oils, sugar and jaggery, fruits, milk and milk products. Despite of an excess consumption of fish when the average energy and protein adequacy of the families when computed (from the actual food intake data), it was seen that only two families (family no.10 and 14) had both calorie and protein adequacy.

A visible dietary inadequacy with respect to vitamin A and riboflavin was noticed among 90.00 per cent of the population surveyed. While 33.33 and 26.66 per cent had ascorbic acid and fat deficiency respectively, their diets were not effective to meet even 50.00 per cent of the requirement.

The nutritional status of the subjects when measured by anthropometry, clinical examination and haemoglobin estimation of the members of these families. It was observed that only 28.00 per cent were found to be optimally nourished based on anthropometric data. Here again the children seemed to be the most affected ones since only one child had normal height for weight among the 16 children examined. However there was no difference between boys and girls.

Among the 40 adults, only 55.00 per cent were found to be normal based on anthropometry. However, drastic forms of under nutrition was not significant phenomena of these families since only 15.00 per cent had chronic energy deficiency among the adults. However, mild forms of B-

complex deficiency and mottling of teeth and dental carries were noticed among 17.00 to 23.00 per cent of the subjects when clinically examined.

Another salient observation was that anaemia was observed only among ten per cent of the adults though their diet was deficient in green leafy vegetables.

Overall analysis of nutritional status of the individuals when assessed revealed that there was much difference between the families ultimately when the nutritional status index was developed, it was seen that there was no much difference between the families since it ranged from 9.9 to 12.3.

When a (food security index) of different families were computed none could be designated as food secure since the values ranged from 61 to 22 against a total index value of 100.

When the household food security was again measured using the food security hunger core module of USDA, it was seen that none of the families were 'food secure'. This finding confirms the results obtained from the present study.

The level of food security enjoyed by the families were found to be associated with the nutritional status of the family members (0.5262), but was not influenced by the quality of life enjoyed by them (0.0638). The major causes of food insecurity among the families surveyed were absence of land for cultivation, spending huge amounts for education of children or for providing dowry for grown up children as well as lack of nutrition education and inability to make use of the available resources to improve their level of food security. Most of the families were trying to maintain their level of food security through simple coping mechanisms such as, taking frequent small loans from non-formal sources, relying heavily on wage work, substituting inferior quality/low cost of staples, legumes and vegetables or going without these.

Appendices

APPENDIX -1

The composition of families based on age, sex and activity

Family No.	Males			Females			Boys			Girls			Total Family size		
	Heavy workers	Moderate workers	Sedentary workers	Heavy workers	Moderate workers	Sedentary workers	10-12	13-15	16-18	4-6	7-9	10-12		13-15	16-18
1	1					1	1	1							4
2	1					1	1			1					4
3	1		1		1	1									4
4	1					1									2
5	1				1	1						2			5
6	1					1		1					2		5
7	1					1									2
8	1					1	2								4
9	1	1			1	1									4
10	1		1			2									4
11	2					2				1	1				6
12	1					1									2
13	1					1			1						3
14	1		1			1									3
15	1					1		1						1	4
Total	16	1	3	0	3	17	2	3	1	2	1	2	2	1	56

APPENDIX II

Distribution of families based on the risk factors

Family risk factors	Family														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Family belonging to SC/ST	X	✓	✓	✓	✓	✓	X	✓	✓	X	X	X	X	✓	✓
2.Families with children below 5 years of age	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.Families having 1 illiterate adult	X	X	X	X	✓	X	X	✓	X	✓	✓	X	✓	X	X
4.Families without one or no adult employed	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5.Family without a household latrine	X	X	✓	✓	X	✓	✓	X	X	X	✓	X	X	X	X
6.Family with no access to safe drinking water	X	X	✓	✓	✓	X	✓	✓	✓	✓	✓	X	✓	X	X
7.Family consuming only two or less meals a day	X	X	X	X	X	X	✓	X	X	X	X	✓	X	X	X
8.Presence of an alcoholic or drug addict or other major crisis	X	✓	X	✓	✓	X	✓	X	✓	X	✓	X	X	X	X
9.Living in Katchahouse	X	✓	X	X	X	✓	✓	✓	X	X	X	X	✓	X	X
Total	0	3	3	4	4	3	5	4	3	2	4	1	3	1	1

APPENDIX III

Actual quantities of foodstuffs purchased by the families with respect to various foods over a month (first inventory survey)

Family No.	Cereal + cereal products + millets, g	Pulses / Dhal, g	Leafy vegetables, g	Other vegetables, g	Roots and tubers, g	Meat, fish, egg, g	Oils and fats, g	Jaggery and sugar, g	Fruits, g	Milk and milk products, ml
1	50500	1600	3750	10660	32750	30000	2000	5500	905	6500
2	56000	950	1240	9280	29400	31800	2000	2250	1000	1250
3	63500	200	3100	10500	9300	33000	2700	2500	2020	8250
4	14500	400	400	2420	12120	9420	600	450	240	3050
5	53000	-	1250	12140	7550	45000	1600	2900	1250	16500
6	45500	400	500	4820	3860	33000	1200	2500	1110	1100
7	14500	-	-	800	1960	14400	600	1050	1680	13500
8	33825	500	-	1760	7930	24000	1150	1600	480	7000
9	94500	9700	500	15920	24200	50240	2550	10650	3000	15350
10	47000	1500	2000	3880	10790	30480	1200	4600	2000	14500
11	54000	2500	3290	10260	18270	43400	2525	2100	4840	14250
12	30000	-	-	8700	12650	13860	300	500	400	11000
13	30025	-	4500	6230	18170	24020	1800	2000	-	12000
14	61000	1450	4000	4920	12710	22480	1350	4700	1900	8750
15	60000	1100	3250	2300	13240	26080	1700	3650	700	7000

APPENDIX IV

**Actual quantities of foodstuffs purchased by the families with respect to various food groups over a month
(second inventory survey)**

Family No.	Cereal + cereal products + millets, g	Pulses / Dhal, g	Leafy vegetables, g	Other vegetables, g	Roots and tubers, g	Meat, fish, egg, g	Oils and fats, g	Jaggery and sugar, g	Fruits, g	Milk and milk products, ml
1	52500	1850	3750	11000	34070	29600	1950	5250	1025	6750
2	58000	1470	1740	9660	30620	25500	2100	1850	1980	1500
3	65500	720	3870	10880	10610	29000	2800	2600	2220	9000
4	15500	400	920	2800	14080	8520	700	450	440	3400
5	54500	520	2290	12500	8690	39653	1700	3000	1330	17250
6	47000	920	1000	5260	5170	37500	1450	2600	980	1850
7	15000	-	-	940	2940	12800	800	1150	1840	7500
8	35825	500	1020	2240	9150	27500	1450	1800	600	8250
9	59500	2700	1020	16620	25760	45580	1550	8900	3440	16050
10	52000	2020	2000	4520	12010	32840	1450	4200	2200	1750
11	56000	2600	3810	10720	19490	58140	2725	3200	4920	15000
12	31000	-	-	8940	12730	12620	400	700	400	11500
13	30800	-	5000	6550	19350	22200	1900	2100	-	13000
14	62000	1550	4520	5140	13930	23180	1550	4200	2100	9750
15	60100	1600	3770	2600	14420	25800	1900	3750	700	7750

APPENDIX V

Per capita availability of food per day (first survey)

Family No.	Cereal + cereal products, g	Pulse / dhal, g	Leafy vegetables, g	Other vegetables, g	Roots + tubers, g	Fruits, g	Milk and milk products, ml	Meat + Fish + Egg	Oils and fats, g	Jaggery / sugar, g
1	423.3	14.9	30.2	88.7	274.7	8.2	54.4	238.0	15.7	42.3
2	467.7	11.8	14.0	77.9	246.9	18.9	12.0	205.0	16.9	14.9
3	528.2	5.8	31.2	87.7	85.5	17.9	72.5	233.0	22.5	20.9
4	250	6.4	14.8	45.1	227.0	7.0	54.8	137.0	11.2	7.2
5	351.6	3.3	14.7	80.6	56.0	8.5	11.2	255.0	10.9	19.3
6	303.2	5.9	6.4	33.9	33.0	6.3	11.9	241.0	9.3	16.7
7	241.9	-	-	15.1	47.4	29.6	120.9	206.0	12.9	18.5
8	288.9	4.0	8.2	18.0	73.7	4.8	66.5	147.0	11.6	14.5
9	479.8	21.7	8.2	134.0	207.7	27.7	129.4	349.0	12.5	71.7
10	419.3	16.2	16.1	36.4	96.8	17.2	14.1	259.0	11.6	33.8
11	301.0	13.9	20.4	57.6	104.7	26.4	80.6	312.0	14.6	17.2
12	500.0	-	-	144.1	205.3	6.4	185.4	203.0	6.4	11.2
13	331.1	-	53.7	70.4	208.0	-	139.7	238.0	20.4	22.5
14	666.6	16.6	48.6	55.2	149.7	22.5	104.8	249.0	16.6	45.1
15	484.6	12.9	30.4	20.9	116.2	5.6	62.5	208.0	15.3	30.2

APPENDIX VI

Percapita availability of foods per day (second survey)

Family No.	Cereal + cereal products, g	Pulse / dhal, g	Leafy vegetables, g	Other vegetables, g	Roots + tubers, g	Fruits, g	Milk and milk products, ml	Meat + fish + egg, g	Oils and fats, g	Jaggery / sugar, g
1	420	1.3	31	88	272	7.5	54	250	16	45
2	466	7.9	10	77	245	8.3	10	264.3	16	18
3	529	1.6	25	87	77	16	68	275	22	20
4	241	6.6	6.6	40	202	4	50	165	10	7.5
5	353	-	8.3	80	50	8.3	110	300	10	19
6	303	2.6	3.0	32	25	7.4	7.3	220	8	16
7	241	-	-	13	32	28	225	240	10	17
8	281	4.1	-	14	66	4	58	200	9.5	13
9	787	80.0	4.1	132	201	25	127	418	21	88
10	391	12.0	16	32	89	16	120	254	10	38
11	300	13.0	18	57	101	26	79	355.5	14	11
12	500	-	-	145	210	6.6	183	231	5	8.3
13	333	-	50	69	201	-	133	266	20	22
14	598	16.0	4.4	54	141	21	97	249.3	15	52
15	500	9.1	27	19	110	5.8	58	198.3	4	30

APPENDIX VII

Food availability per consumption unit (CU) per day

Family No.	Cereal + cereal products, g	Pulse / dhal, g	Leafy vegetables, g	Other vegetables, g	Roots + tubers, g	Fruits, g	Milk and milk products, ml	Meat + Fish + Egg	Oils and fats, g	Jaggery / sugar, g
1	348.8	13.5	27.4	80.6	249.7	7.5	49.4	217.0	14.2	38.4
2	492.3	12.4	14.7	82.0	259.9	16.8	12.7	216.4	17.8	15.7
3	469.5	5.1	27.7	77.9	76.0	15.9	64.5	207.8	20.0	18.6
4	208.0	5.3	12.3	37.6	189.2	45.6	45.6	114.5	9.4	6.0
5	358.7	3.4	15.0	82.2	57.2	8.7	113.5	261.0	11.1	19.7
6	280.7	5.4	5.9	31.4	30.8	5.8	11.0	224.0	8.6	15.5
7	201.6	-	-	12.6	39.5	24.7	100.8	172.0	10.7	15.4
8	288.9	4.0	8.2	18.0	73.7	4.8	66.5	221.7	11.6	14.5
9	426.5	19.3	7.3	119.1	184.6	24.6	115.0	326.6	11.1	63.7
10	399.3	15.5	15.3	34.7	92.2	16.8	13.4	252.1	11.1	32.2
11	296.1	13.7	20.1	56.6	103.0	26.0	79.3	307.4	14.4	16.9
12	416.6	-	-	120.1	171.1	5.3	154.5	169.6	5.3	9.4
13	292.2	-	47.4	62.1	183.5	-	123.3	210.6	18.0	19.9

APPENDIX VIII

Food availability per consumption unit (CU) per day (second survey)

Family No.	Cereal + cereal products, g	Pulse / dhal, g	Leafy vegetables, g	Other vegetables, g	Roots + tubers, g	Fruits, g	Milk and milk products, ml	Meat + fish + egg, g	Oils and fats, g	Jaggery / sugar, g
1	382	12	28	80	248	6.8	49	227	15	41
2	491	8.3	10	81	257	8.7	10	278.7	17	19
3	470	1.4	22	77	68	14	61	244	20	18
4	201	5.5	5.5	33	168	3.3	42	137	8.3	6.2
5	360	-	8.5	82	51	8.5	112	306	10	19
6	280	2.4	3	29	23	6.8	6.7	203	7.4	15
7	201	-	-	11	27	23	187	200	8.3	14
8	281	4.1	-	14	66	4	58	200	9.5	13
9	700	71	3.7	117	179	22	113	371	18	78
10	373	11	15	30	85	15	115	241.8	9.5	36
11	295	13	17	56	99	26	77	338.4	13	11
12	416	-	-	120	175	5.5	152	192	4.1	6.9
13	294	-	44	61	178	-	117	234	17	19
14	598	14	39	48	124	18	85	219.5	13	46
15	454	8.3	24	17	100	5.3	53	216.5	12	27

APPENDIX IX
The coping mechanisms adopted by the families

Indicators	Families														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Owing poor quality land or no land	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Holding distress sale of large livestock or small livestock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holding distress sale of other productive assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holding distress sale of other valued assets such as jewellery	✓	✓	✓	-	✓	-	-	-	✓	✓	✓	✓	-	✓	✓
Holding distress sale of other valued assets such as land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holding distress sale of other valued assets such as house	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taking out a high number of small loans from informal sources neighbours	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taking out a high number of small loans from informal sources relatives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taking out a high number of small loans from informal sources shopkeepers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Relying heavily on wage work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Accepting attached labour positions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suffering physical disabilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suffering physical chronic illness	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Having few income earners in large family	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-
Purchasing staple grain more than once in a week	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Migrating in search of work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Women who work for wages and have young children	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Substituting inferior quality staple food for preferred quality	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Substituting inferior quality vegetables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Substituting inferior quality legumes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Going without legumes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Going without vegetables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Substituting gruels for the main staple (to stretch consumption)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Providing dowries	-	-	-	-	-	-	-	-	✓	-	-	✓	-	-	-
Celebrating religious holidays	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Buying gifts and fulfilling obligations to relatives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Repayment of consumption loan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of ancestral debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Huge amount spend on the construction of building or house	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-Education of children	✓	✓	✓	-	✓	✓	-	✓	-	-	✓	-	✓	-	✓
Total	15	15	15	13	15	14	13	14	15	14	16	15	14	14	15

APPENDIX X continued...

8. [IF YES ABOVE, ASK] How often did this happen- almost every month, some months but not every month, or in only 1 or two months?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9. In the last 30 days did you ever eat less than you felt you should because there was not enough money to buy food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. In the last 30 days were you every hungry but did not eat because you cannot afford enough food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11. In the last 30 days did you lose weight because you did not have enough money for food ?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12. In the last 30 days, did (you/you or other adults in your households) ever not eat for a whole day because there was not enough money for food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13. (IF YES ABOVE, ASK) How often did this happen-almost every month, some months but not every month, or in 1 or 2 months.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
★C. 14 If children under 18 in the household ask 3-16. In the last 30 days since (current month) of last year, did you ever cut the size of (yes child's/any of the childrens) meals because there was not money for food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*C 15. In the last 30 days did (CHILD'S NAME / any of the children) ever skip meals because there was not enough money for food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16. [IF YES ABOVE, ASK] How often did this happen-almost every month, some months but not every month or in one or two months ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17. In the last 30 days (was your child/were the children) ever hungry but you just could not afford more food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18. In the last 30 days, did (your child/ any of the children) ever not eat for a whole day because there was not enough money for food ?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total scores	15	15	8	8	15	15	8	15	2	8	15	8	15	8	15