FOOD AND NUTRITION SECURITY OF PADDY CULTIVATORS OF KALLIYOOR PANCHAYAT

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DECLARATION

I here by declare that this thesis entitled **"**Food and Nutrition Security of Paddy Cultivators of Kalliyoor Panchayat**"** 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 of any degree, diploma, associateship, fellowship or other similar title of any other university or society

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CERTIFICATE

Certified that this thesis entitled **"**Food and Nutrition Security of Paddy Cultivators of Kalliyoor Panchayat**"** is a record of research work done independently by **Naziya Latheef(2007-16-102)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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LIST OF ABBREVIATIONS

PDS	-	Public distribution system
TPDS	-	Targeted public distribution system
RDA	-	Recommended dietary allowance
ICMR	-	Indian council of medical research
et al	-	and others
FSI	-	Food security index
BMI	-	Body mass index
WHR	-	Waist hip ratio
NSI	-	Nutritional status index
SPSS	-	Statistical Package for Social Science
SD	-	Standard deviation

Introduction

INTRODUCTION

Food security has been a matter of concern in recent years due to the global food crisis and rising food prices. Food security is an issue that is much discussed in the context of food, health and agriculture. Agriculture remains the largest employment sector in most developing countries and international agriculture agreements are crucial to a country's food security.

Food security is not just a poverty issue; it is a much larger issue that involves the whole food system and affects everyone of the society in one way or other. Food security is a multidimensional phenomenon. To be food secure means the ready availability of nutritionally adequate and safe foods and an assured ability to acquire acceptable foods in socially acceptable ways.

According to Prof: M.S.Swaminathan (2002), food security is built on three pillars. They are food availability which means sufficient quantities of food available on a consistent basis, the second pillar food access means having sufficient resources to obtain appropriate foods for a nutritious diet and the third one food utilization which means appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

Food security is a complex sustainable development issue, linked to health. Issues such as food sufficiency at households, distribution within the households and the nutritional adequacy of all members of the household, reveal that food security is clearly linked to health.

A household is food secure when it has access to the food needed for all its members to lead a healthy life and when there is no undue risk of loosing such access. Nutrition security is the condition when every person has a diet nutritionally adequate in quantity and quality and the food consumed is biologically utilized for a healthy

living.(Babu,2000). It is important that every household should either have capacity to produce adequate food for all members or have purchasing power to acquire it.

The nutritional status of each member of the household depends on several conditions; the food available to the household must be shared according to individual needs, the foods must be sufficient, having variety, quality and safety and each family member must have good health status in order to benefit from the food consumed.

The health status of the household can be determined by the nutritional status of women since they hold total responsibility to provide food for the family members. Women's access to adequate food security, both for themselves and their families is dependent, not only on their economic status but on their own health, education and social status within the family and in society.

Household is the basic unit of a society and consumption expenditure is a major determinant of food security. A well functioning universal public distribution system (PDS) can be the means to ensure adequate physical access to food at affordable prices at the household level. PDS is the biggest grain distribution programmes in the world assuring food security to trillions of households, especially during period of stress.

Paddy cultivation is the part and parcel of Kerala culture and it is the State's major food crop. Despite these facts, the area and production of paddy continues to decline over the years. Though 50 per cent self sufficiency in rice cultivation was achieved during 1974-75, the area and production of paddy declined at an alarming rate in the later years. (George, 2008)

Reports stated that, though the paddy cultivators who were producers of food grains were not enjoying food security. It is commonly believed that agricultural production directly affects food security. Rising agricultural productivity increases rural income and lowers food prices, making food more accessible to the poor.

Studies conducted with regard to nutritional status of women from agricultural households shows that their diet lack macro as well as micro nutrients and their status is far from satisfactory, affecting their health and well being.

Keeping these facts in view, the present investigation was undertaken to study the household food and nutrition security of selected paddy cultivators in Kalliyoor panchayat. The specific objective of the study is to find out food security indicators of selected families as well as the nutrient adequacy of the selected housewives belonging to these families.

Review of Literature

2. **REVIEW OF LITERATURE**

Literature pertaining to the topic, "Food and nutrition security of paddy cultivators of Kalliyoor Panchayat" are presented under following heads.

2.1. Definition of food security
2.2. Food and nutrition security at rural households.
2.3. Concept of food insecurity
2.4. Types of food insecurity.
2.5. Consequences of food insecurity
2.6. Measures to reduce food insecurity
2.7. Measures at government level to reduce food insecurity.

2.1. Definition of food security

Food security as a concept originated in the mid- 1970's, in the discussion of International food problems at a time of global food crisis. The initial focus, reflecting the global concerns of 1974 was on the volume and stability of food supplies. Food security was defined in the 1974 World Food Summit as:" availability at all times of adequate world food supplies of basic foodstuff to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".

The widely accepted World Food Summit (1996) definition reinforces the multidimensional nature of food security and includes food access, availability, food use and stability. "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".

The term Food Security may mean different things to different people. Its widely used in different contexts.(Ayalew,2005)

Food security is a subjective concept defined as an individual farmer's own perception as to whether he/she has been able to support the family's food and fodder requirements adequately round the year using all resources under his control (Hiremath, *et al*., 2004).

FAO (2010) defined Food security as it exists when "All people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life".

Radhakrishnan (2005) defined that the modern concept of food security goes far beyond the availability and accessibility of staple food. It includes the man's need for safe drinking water, clean surrounding environment and health cover.

The widely accepted definition of food security in the modern context is: "physical, economical, social and environmental access to balanced diet and clean drinking water for all and forever".

2.2. Food and nutrition security at rural households.

A household is food secure when it has access to the food needed for a healthy life for all its members and when it is not undue risk of losing such access.(Sainath, 2006) According to WHO (2009) a household is 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. It is important that every household should either have capacity to produce adequate food for all members or have purchasing power to acquire it.

According to Gillespie and Mason (1991) each household must have the knowledge and ability to produce or to procure the food that needs on a sustainable basis.

Prakash (2003) defined household food security as the application of nutrition security concept at the family level, with individuals within households as the focus of concern.

The lack of adequate access is a function of either production fluctuation or price fluctuation or both. These two fluctuations leading directly to a fluctuation in real income affecting the farmers, agricultural labourers, as well as other members of the society, will ultimately have an impact on household food consumption, that of the poorer households being particularly sensitive. (Alberto Valde's, 2001).

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.

The nutritional status of each member of the household depends on several conditions: the food available to the household must be shared according to individual needs, the foods must be sufficient, having variety, quality and safety and each family member must have good health status in order to benefit from food consumed. Food is such a high priority for poor households that many may be tenuously secure.(Patnaik,2003)

Women control over the household income needs to be enhanced through fostering opportunities for women's employment and for remuneration of production from household assets. The role of women as producers and providers of food is often overshadowed by their primary role as care-givers.

Poongodi *et al.*,(2007)studied that the households wherein women have access to their own income and can exercise decision making powers, tend to have an expenditure pattern different to the one existing in male dominated households.

According to Dyer and Bruce (2001) women in poor households spend and invest most of their earnings on basic household needs, nutrition and health.

Lisa *et.al* (2003) reported that women's access to adequate food security, both for themselves and their families is dependent, not only on their economic status but on their own health, education and social status within the family and in society. The factors are closely related to woman's own nutritional status and the quality of care they receive.

Nira and Ramachandran (2003) studied that it's the extent and spread of maternal and child care that greatly influence the status of household food and nutrition security.

The female illiteracy is also one of the very important indicators of food and nutrition security. Specific micronutrient programme should be considered for improving household food security. Unemployment being a great aggravating factor with rapidly growing population impairs the purchasing power of a large number of households.

According to Dreze(2001) PDS may reach the poorest subsistence farmer and at the same time provide a last resort price support for small/marginal farmers that give him a minimum standard of living.

The Targeted Public Distribution System (TPDS) also protects poor from adverse effects of rise in prices and ensures food and nutrition security at affordable prices.

2.3. Concept of food insecurity.

Food insecurity exists when people do not have adequate physical, social or economic access to food for a healthy and productive life.

Swaminathan (2002) was of the opinion that inadequate livelihood opportunities results in nutrition insecurity.

The main and primary cause of food insecurity is poverty, lack of purchasing power among the poor and inefficient functioning of PDS.

According to Mukherjee (2007) food insecurity has been variously defined. A nation or a community or a household is considered to be free from food insecurity if five conditions are met when food is available at all times, that is, there is enough food in the system, food that is systematically available is also culturally acceptable, people have economic access to food, that is, purchasing power to buy food, food that people consume has the requisite nutritional value for a healthy life and people have access to potable water, for absorption of food by the body.

Whenever any of these conditions or combination thereof are violated, food security is jeopardized, and food insecurity sets in. (Sen, 2000)

In official parlance food insecurity is defined in terms of calorie intake. The "subjacent food insecure comprise those consuming between 1800-2200 calories per day; medial food insecure are those with calorie intake between 1600-1800 per day; and the ultra food insecure have the lowest calorie intake less than 1600 calories per day" (Gaiha and Kulkarni, 2008)

2.4. 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 or economic factors. It is related not only to existing malnutrition of people in a region but also to the lack of access to safe drinking water, poor sanitation and health conditions. Chronic food insecurity refers to a situation in which people consistently consume diets inadequate in calories and in essential

nutrients. Transitory food insecurity is a temporary short fall in food availability and consumption.

The World Bank (1990) reported 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 and so on.

2.5. Consequences of food insecurity.

Food insecurity results in catastrophic amounts of human suffering. (Sirshi,2003).The WHO estimated that approximately 60 per cent of all childhood deaths in developing world are associated with chronic food insecurity and malnutrition. They are weak, vulnerable and are at a greater risk of dying from common diseases.

Food insecurity may also results in several social, psychological and behavioral consequences. Food insecure individuals may manifest feelings of alienation, powerlessness, stress and anxiety and they may experience reduced productivity, reduced work and reduced income earnings.(Palmer,2000)

2.6. Measures to reduce food insecurity.

Harris and Shobha (1990) reported that food insecurity may be removed by ensuring sustainable livelihoods, improving literacy, providing better health care and access to safe drinking water and ensuring sufficient micronutrient intake.

The measures suggested are to identify families and individuals suffering from endemic hunger that is induced by poverty. Providing household entitlement card to vulnerable sections which provides information on all Government projects aimed to

eliminate poverty and hunger. The mobilization of existing schemes of TPDS. Interventions such as fortification of foods, administration of oral doses of vitamin A, iron and fortified salt. The highest priority should be of elimination of "hidden hunger" (Linder, 2000).

2.7. Measures at government level to reduce food insecurity.

During the last few years, the Government have initiated many programmes like Jawahar Rojgar Yojana, Sampoorna Gramin Rojgar Yojana, Annapoorna, Antyodaya Anna Yojana and Universal noon-meal programme in order to reduce food insecurity.

Maheswari and Khader(2005) conducted a study on contribution of Jawahar Rojgar Yojana programme for food security of women in landless labour families and found a positive trend towards improvement in food security situation assessed by food and nutrient intake with additional income generated through this programme.

The Government (2003-04) declared the initiation of Sampoorna Gramin Rojgar Yojana, with an initial allocation of 5 million tones of food grains for organizing food for work programme.(George, 2003).

The Tenth five year plan (2002-2007) focused on comprehensive interventions for improving nutritional and health status of individuals by prioritizing nutrition security.(Planning Commission,2001)

FCI was set up under Food Corporation Act 1964 in order to maintain satisfactory level of operational and buffer stocks of food grains to ensure National Food Security and also proper functioning of TPDS.

A country can be said to have achieved complete food and nutrition security if each and every person in that country is able to consume a minimum quantum and quality of various ingredients that is, an adequate and balanced diet on regular basis.

Materials and Methods

3. MATERIALS AND METHODS

Methodology in the applied sense refers to various methods used by the researcher right from data collection and various techniques used for the interpretation and inference. (Mohan Kumar, 2002).

The methodology adopted for the study entitled ”Food and Nutrition Security of Paddy Cultivators of Kalliyoor Panchayat” is presented in this chapter under following heads.

3.1 Locale of the study.
3.2 Selection of respondents.
3.3 Criteria of selection.
3.4 Formulation of research tools.
3.5 Methods of data collection.
3.6 Statistical analysis.

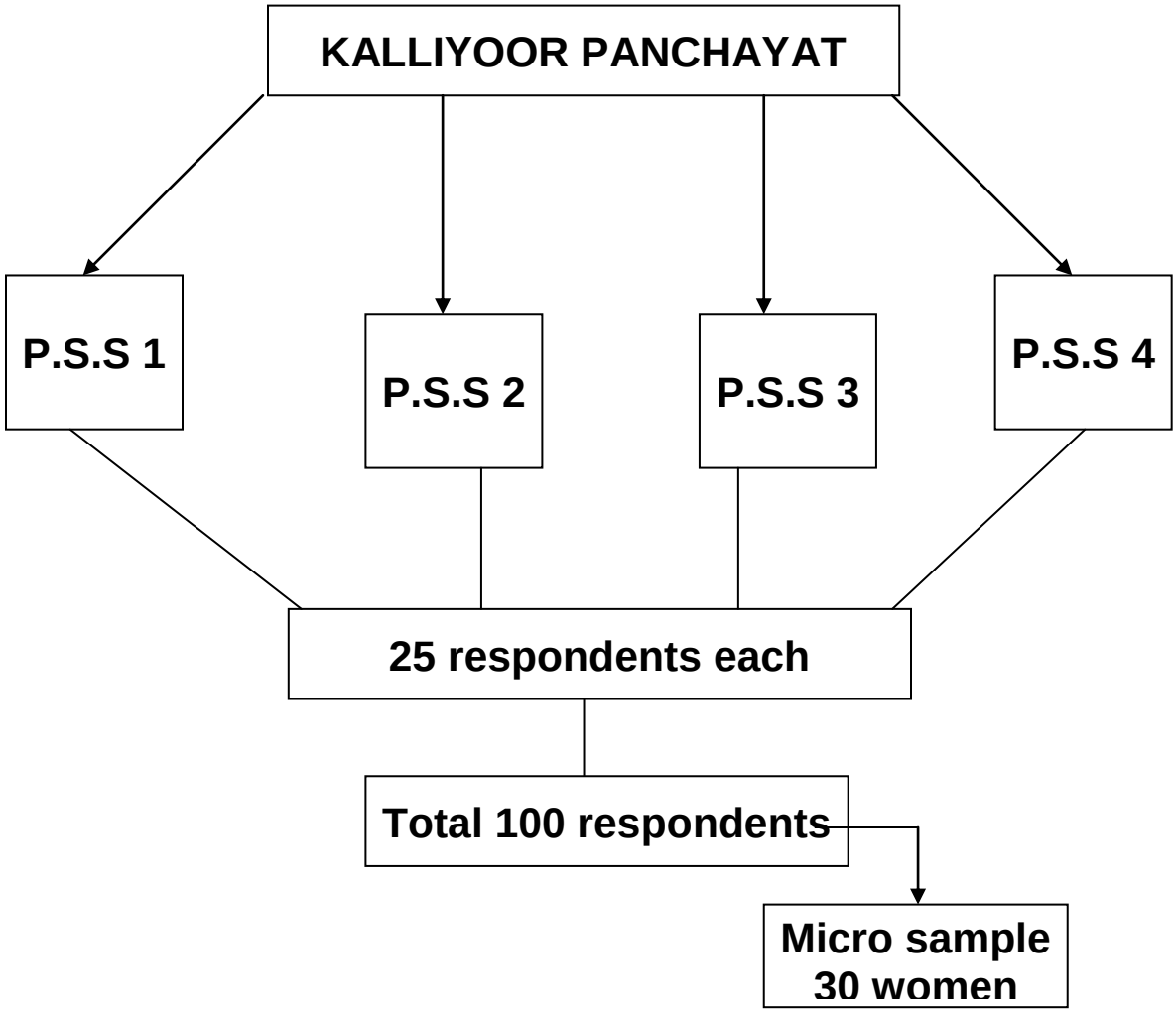
3.1 Locale of the study

The locale of the study selected was Kalliyoor Panchayat, an adopted village of College of Agriculture, Vellayani. This panchayat has four existing “Padashekharam Samitis”. Seventy five per cent (75%) members of the “Padashekharam Samitis” were engaged in paddy cultivation.

3.2 (a) Selection of respondents

The study was conducted among one hundred paddy cultivators drawn at random, 25 respondents each from the existing four Padashekharam Samitis of Kalliyoor Panchayat.

Fig 1: SAMPLING DESIGN



(b) Selection of micro sample

Among the hundred families selected, thirty women were identified to undergo clinical examination and biochemical tests to assess the food utilization.

3.3 Criteria for selection

The criteria chosen for selection of respondents were,

1. Marginal farmers who were having land less than 2 acres.
2. The farmers who had cultivated either viruppu, mundakan or punja yearly during last 5 years.
3. Age range 35-45 years was the criteria fixed for the selection of women who volunteered for in depth study as micro sample among the selected hundred families.

Formulation of research tools

The research tools were formulated by reviewing the literature available. The research tools were suitably structured and pre-tested. The formulated schedules are:-

Interview schedule- to assess socio-economic status.

Household food production/purchase inventory- to assess the food availability and accessibility

Dietary survey schedule-to assess the food consumption pattern.

Anthropometric measurement.

Biochemical tests

Clinical assessment- schedule to assess the health status

One day weighment survey - to assess the nutrient availability of micro sample.

In this study, the schedule developed to elicit information on socio-economic characteristics was formed in such a way to collect details regarding age, religion, caste, educational status, size of family, family composition, total monthly income, employment status etc.
The schedule developed was pre-tested, which is given in Appendix-1.

Availability and access of food resources to the households was assessed by household food production/purchase inventory. This was executed by making a log book in which the respondents noted the details of the food items purchased for a month.

By using modified version of indicators suggested by Chung *et.al* (1991), Food Security Index was calculated.

According to Swaminathan (1993) diet surveys constitute an essential part of any complete study of nutritional status of individuals or groups providing essential information on nutrient intake levels, sources of nutrients, food habits and preferences. The diet survey was done to assess the dietary pattern besides, their food habits like skipping of meals and personal habits.
The schedule developed was pre-tested, which is given in Appendix-2.

Measuring Anthropometry of micro sample

Anthropometry provides the single most universally applicable, inexpensive technique for assessing the size, proportions and composition of human body. Anthropometry remains the conventional bench mark for epidemiological purpose (Sachdev and Agarwal, 2003).

Anthropometric measurements namely weight, height and waist hip ratio (WHR) measurements of respondents were used to assess the nutritional status.

Weight: Body weight is the most widely used sensitive and simplest reproducible anthropometric measurements. It indicates body mass and is a composite of all body constituent like water, internal fat, protein and bone.

For weighing, platform weighing balance was used as it is portable and is convenient to use in the field. The weighing scale was checked periodically for accuracy. The scale was adjusted to zero before each measurement.

Height: To determine height, a stadiometer was used. The respondents were asked to stand on the stadiometer with head held erect, arms hanging close by side with centre of back touching wall and the height was measured in inches/cm.

Body Mass Index(BMI): BMI is regarded as a good indicator of nutritional status. BMI is expressed as the ratio of weight to height square
ie, BMI= weight(kg)/ height (m^2)

BMI appears to be the most practical way of measuring and comparing obesity for clinical and epidemiological purposes. (Bhave *et al.*,2004).

Waist-Hip Ratio(WHR):According to Higgies *et al.,(*2001) waist circumference is a highly sensitive and specific measure of central obesity. After documenting the waist and hip measurements of the respondents their WHR was calculated by dividing the circumference of the waist by the circumference of the hip.

Biochemical Assessment: It is one of the most important tools for assessing the nutritional status of the subject. In this study the haemoglobin level of the identified 30 women were estimated as proxy measure for nutrient status of the micro sample for determination of dietary adequacy or risk.

Haemoglobin content was estimated by cyanmethaemoglobin method as described in the Manual of Laboratory Techniques by NIN (ICMR, 1994).

Clinical examination: According to Swaminathan (2004) clinical examination is the important part of nutritional assessment as direct information of signs and symptoms of dietary deficiency prevalent are obtained.

The presence of clinical symptoms of deficiency which is an index of nutritional status was assessed by a qualified physician using ICMR performa with necessary adaptations. The schedule is given in Appendix-3

One-day weighment survey: It was done for assessing the actual food intake. During the weighment survey, all raw foods used for family cooking were weighed and total cooked food weight of each preparation was recorded. The food consumed by the individual and items remaining after eating were also weighed to find out the exact amount of food consumed by them. Individual intake is expressed in terms of raw equivalents.

The schedule developed for weighment survey and the raw equivalents formula is appended in Appendix-4.

Using these parameters nutritional status index (NSI) for the micro sample was computed.

$$NSI = \sum \frac{[Xij - Nij]}{Sij}$$

Where Xij is the observed value,

Nij is the normal value,

Sij is the standard deviation.

Food use frequency: Frequency of use of different food items in the dietaries of the respondents clearly indicate the adequacy of the diets consumed by them. Based on the frequency of use of different food items, food use frequency scores were calculated as suggested by Reaburn *et al.*,(1979).

$$\text{Percentage of total score for each food group} = \frac{R_1S_1 + R_2S_2 + R_3S_3 + \ldots + R_nS_n}{n}$$

S1= scale of rating given for frequency of use of a food item. (i=1, 2,3…7)
R1= percentage of respondents coming under each frequency group(i=1, 2,3 …7)
n= Maximum scale rating. (n=7)

Methods of data collection.

Interview method was used for the collection of data .Gupta (1987) has stated that the information received from an interview schedule was more reliable as the accuracy of the statements could be checked by supplementary questions wherever necessary.

To elicit information regarding the socio-economic characteristics and dietary pattern of respondents, oral questionnaire method was used. In the present study, the method suggested by Swaminathan (1993) was followed wherein the investigator goes around with a schedule for collecting information from the respondents regarding family details.

Statistical Analysis

The collected data was analyzed statistically to identify the determinants of food and nutrient security of paddy cultivators and also the nutritional status of the targeted group.

Data analysis was done by using computer facility of College of Agriculture and Statistical Package for Social Science (SPSS).The statistical techniques used in the analysis of data are Frequency and Percentages, Mean, Standard Deviation (SD), Chi square tests, Correlations and ANOVA.

Results

4. RESULTS

A study was conducted to assess the food and nutrition security of the paddy cultivators of Kalliyoor panchayat. The results of this experiment is presented under following heads.

4.1. Socio-economic and personal characteristics of the respondents.
4.2. Food consumption pattern of the respondents.
4.3. Food Security Index (FSI) of the respondents.
4.4. Association of FSI with selected socio-economic variables.
4.5. The assessment of nutritional status of the micro sample.
4.6. Nutritional Status Index (NSI) of the microsample.
4.7. Association between NSI and FSI in micro sample.

4.1. Socio-economic and personal characteristics of the respondents.

Socio-economic and personal characteristics were analyzed with reference to age, religion, caste, employment, income, family type, educational status of the respondents, housing conditions, source of drinking water, possession of crops and livestock. The data analyzed thus is presented in Table 1.

Table 1: Percentage distribution of respondents based on their age, religion, caste and family type.

Characteristics	Category	Percentage	Total
Age (years)	<25 years	31	100
	25-55 years	45	
	>55 years	24	
Family type	Nuclear	84	100
	Joint	16	
Religion	Hindu	77	100
	Christian	23	
Caste	Forward	13	100
	Backward	23	
	SC/ST	64	

As depicted in the above table 45 per cent of the respondents were 25-55 years old, 31 per cent were below 25 years and 24 per cent were above 55 years. Majority (84 per cent) belonged to nuclear families. The remaining were from joint families. The table further revealed that among the 100 people surveyed 77 per cent were Hindus and 23 per cent were Christians and none was from Muslim community. Among the families

surveyed majority (64 per cent) belonged to SC/ST community and 23 per cent belonged to backward classes. Only 13 per cent belonged to forward caste.

Table 2: Percentage distribution of respondents based on educational qualification

Educational status	Percentage
Illiterate	26
Primary school level (V std)	15
Middle school level (VII std)	29
High school level (X std)	30
Total	100

N =100

The educational status of the respondents revealed that nearly 30 per cent had studied upto high school, 29 per cent had studied upto middle school and 15 per cent studied upto primary level. Illiterates constituted about 26 per cent of the population.

Table 3: Percentage distribution of employed members in the family.

Number of members employed	Percentage
One member	90
Two member	7
Three member	3
Total	100

N =100

Number of members employed in the families influence the total income of the family. Analysis of the occupational status of the respondents revealed that there was one

employed member in 90 per cent of the families. 7 per cent families had two earning members while 3 per cent families had three earning members.

Table 4: Percentage distribution of families based on monthly income.

Monthly Income (Rs.)	Percent
980 – 2935	49
2936 – 4893	45
4894 – 7322	4
> 19575	2
Total	100

N =100

(Source: Modified version of Kuppuswamy's socio-economic profile, 2007)

Details in the table indicated that 49% of the families had a monthly income ranging from Rs980-Rs2935, while 45% had an income ranging from Rs 2936-Rs4893.

Table 5: Percentage distribution of families based on monthly expenditure pattern

Categories of expenditure	Rs100-500	Rs501-1000	>Rs1000	No expenditure	Total
Food	-	17	83	-	100
Clothing	69	27	4	-	100
Housing	96	4	-	-	100
Travel	73	18	2	7	100
Education	14	10	2	74	100
Entertainment	-	2	-	98	100
Health care	70	30	-	-	100
Savings	2	2	2	94	100

N =100

From table 5, it was observed that 83 percent spent above Rs1000 for food. Sixty nine percent among the respondents spent Rs100-250 for clothing since they used to buy on hire purchase. Analyzing expenditure for housing it was found that 96 percent spent Rs150-200 on this category. Seventy three per cent of the respondents spent Rs100-250 for their travel expenses. It was clearly found that majority of the respondents spent no money for entertainment, savings and education (98 per cent, 94 per cent and 74 per cent respectively). Among the surveyed respondents, 65 per cent spent Rs100-250 for health care.

Table 6: Percentage distribution of respondents based on possession of cultivable land.

Area of cultivable land	Type of land		Percentage
	Owned	Leased in	
>25 cent	5	17	22
25-50 cent	2	46	48
51-75 cent	3	25	28
76-1 acre	-	2	2
Total	10	90	100

N =100

As depicted in the table 6, 48 per cent among the respondents possessed 25-50 cents of cultivable land of whom 4.1 per cent owned land and 95.8 percent were cultivating in leased-in land. Only 2 percent possessed below 1 acre of land.

Table 7: Percentage distribution of families based on possession of livestock

Animals	Percentage
Cow	14
Goat	8
Nil	78
Total	100
Birds	Percentage
Hen	15
Nil	85
Total	100

N =100

Among the surveyed respondents, 14 per cent possessed cows, 8 per cent goats and 15 per cent hens.

Table 8: Percentage distribution of families based on type of housing.

	Type of possession		
Type of Housing	Owned	Rented	Percentage
Thatched	18	-	18
Asbestos	67	2	69
Concrete	13	-	13
Total	98	2	100

N =100

The table denoted that, 98 per cent had their own homes and 2 per cent lived on rented houses. When 67 per cent had asbestos roofed houses, 18 per cent had thatched and 13 per cent concrete roofs. As per findings of the study majority of the respondents depended on water from public taps (58 per cent), 42 per cent depended on water from

well. Latrine/sanitation facility was available for all the respondents. It was found that wastes from households were disposed by putting them to fire. The respondents depended on nearest Primary Health Care Centers for physical ailments.

Table 9 presents inter correlations among the selected socio-economic variables, age, family type, monthly income and money expenditure for food.

Table 9: Correlation among selected socio-economic variables

Parameters	Age	Family Type	Monthly Income	Money Expenditure: Food
Age	1			
Family Type	-0.143	1		
Monthly Income	0.183	0.03	1	
Money Expenditure on Food	-0.013	0.271**	0.515**	1

(* P < 0.05; ** P < 0.01)

Statistical analysis showed that expenditure on food was positively and significantly associated with family type and monthly income.

Table 10: Percentage distribution of respondents based on crops cultivated

Crops Cultivated	Percentage
Paddy	95
Paddy+ Vegetables	3
Vegetables	2
Total	100

N =100

The most important crop cultivated was paddy; 95 per cent being engaged in paddy cultivation. Three per cent were found to cultivate paddy and vegetables together and 2 per cent cultivated vegetables alone. Snakegourd and field beans were the only vegetables cultivated.

Table 11: Percentage distribution of families based on quantity of production, consumption and sale of paddy and vegetables during the previous year.

Range	Production		Household consumption		Sale	
	Paddy	Veg	Paddy	Veg	Paddy	Veg
<50kg	14	5	10	1	4	4
50-100kg	21	-	5	-	16	-
100-500kg	60	-	3	-	57	-
Total	95	5	18	1	77	4

It was found that maximum production of paddy ranged from 100-500kg (60 per cent). Almost 50 per cent of the production is found to be sold. Production of vegetables were comparatively low. It was observed that with increase in production of paddy, consumption of paddy in households has decreased because 90 per cent of the respondents cultivated on leased-in land. The respondents were forced to sell paddy which they receive as wages to meet their household expenditure.

Table 12: Production of other food crops during last year

CROPS	< 50 Kg	50 - 100 Kg	100 - 500 Kg	> 500 Kg	Nil	Total
Pulses & Legumes	24.0	-	-	-	86.0	100
Roots & Tubers	62.0	-	-	-	38.0	100
Other Vegetables	4.0	2.0	2.0	-	92.0	100
Coconuts	2.0	-	-	-	98.0	100

N =100

Production of roots and tubers was below 50kg among 62 per cent of the respondents as depicted in the Table 12. It was found from the table that only 24 per cent

cultivated pulses and legumes and their yield was also below 50kg during off season. None of the respondents was engaged in rubber cultivation and only two percent had coconut trees of an average number six.

4.2. Food consumption pattern of the respondents

Food consumption pattern was analyzed with regard to food habits using food purchase inventory and food use frequency score.

a) Food habits

The food habits of the families surveyed were analyzed and is presented in Table 13

Table 13: Percentage distribution of families based on food habits

Number	Habit	Percentage
1	Vegetarian	7
2	Non-vegetarian	93

N =100

Regarding the food habits, non-vegetarians (93 per cent) were found to dominate vegetarians (7 per cent). Minority of the respondents avoided oily foods and commercially prepared food items. They also avoided locally available nutritious foods such as papaya, custard apple and green leafy vegetables.

Table 14: Percentage distribution of respondents based on frequency of taking meals daily.

No: of meals per day	Percentage
One	2
Two	14
Three	84
Total	100

N =100

The table indicated that 84 per cent respondents had three meals a day. 14 percent had two and 2 per cent one meal per day from home.

Table 15: Distribution of respondents based on meal skipping pattern

Skipping meals	Percentage
Nil	84
Breakfast	14
Lunch	-
Dinner	2
Total	100

N =100

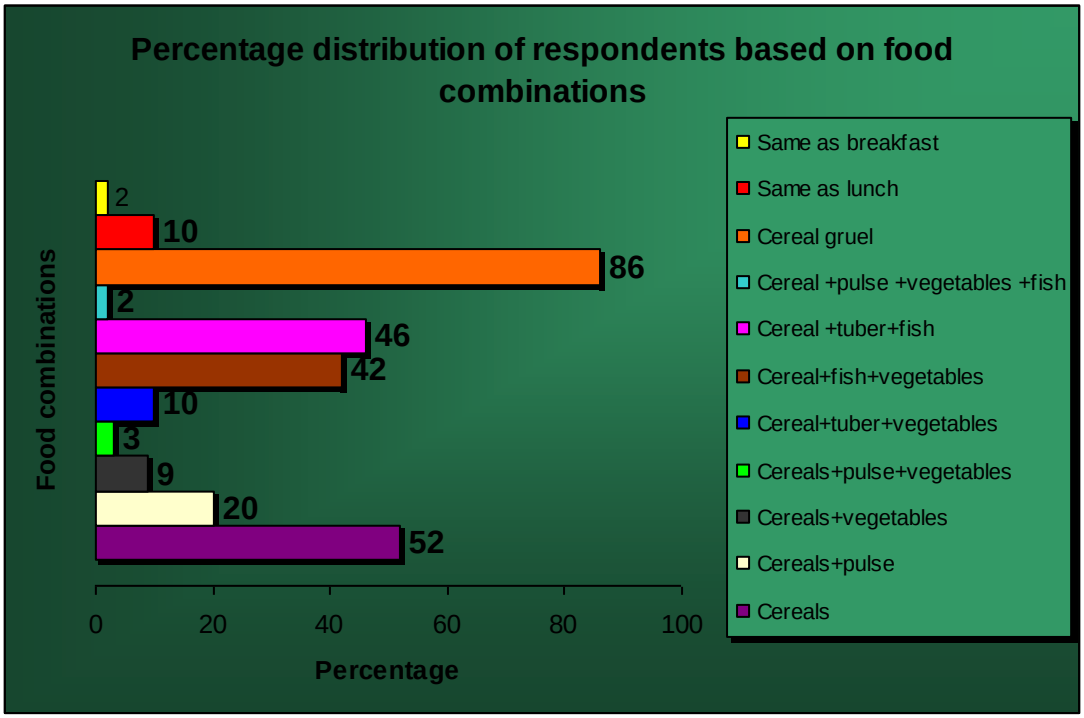
It was observed that 84 per cent of the respondents did not skip meals, while 16 per cent skipped meals. Most of the skippers were found to be housewives, 2 per cent female adolescents also reported to skip breakfast.

Minority of the respondents(9 per cent) avoided oily foods and commercially prepared food items mainly due to the lack of purchasing power. Moreover they were not having the habit of eating snacks in between the main meals.

Table 16. Percentage distribution of the respondents with regard to food combination of meals

Food Combination (Breakfast)	Percentage	Total
Cereals	52	86
Cereals+pulse	20	
Cereals+vegetables	9	
Cereals+pulse+vegetables	3	
Food combinations (Lunch)		100
Cereal+tuber+vegetables	10	
Cereal+fish+vegetables	42	
Cereal +tuber+fish	46	

Fig- 2


Percentage distribution of respondents based on food combinations
Food combinations
Percentage
0
20
40
60
80
100
2
10
86
2
46
42
10
3
9
20
52
Same as breakfast
Same as lunch
Cereal gruel
Cereal +pulse +vegetables +fish
Cereal +tuber+fish
Cereal+fish+vegetables
Cereal+tuber+vegetables
Cereals+pulse+vegetables
Cereals+vegetables
Cereals+pulse
Cereals

Cereal+vegetables+meat/egg	-	
Food combinations (Dinner)		98
Cereal gruel	86	
Same as lunch	10	
Same as breakfast	2	

As the table explains, it was observed that cereal preparations like idli, dosai, uppuma was the commonly used breakfast item by 52 per cent of the respondents. While 20 per cent of the respondents had cereals along with pulses and 9 per cent had cereals with vegetables only, 3 per cent consumed cereals along with pulses and vegetables.

Rice with tuber and fish (46 per cent) and rice with vegetables and fish (42 per cent) was found to be predominant combinations for lunch in most of the families while 10 per cent were of the practice of taking tuber and vegetables. It was noticed that a minority consumed pulse, vegetable and fish (2 per cent).

Analysis of food combinations of dinner was seen to be similar to lunch. Ten per cent consumed the left over preparations of lunch for dinner. Rice was consumed in the form of gruel along with chutney for dinner (86 per cent). Fig 2 shows the graphical representation based on the food combination.

The frequency of use of food items were quantified; the daily used food items were given the score 7, those food items used thrice a week were given a score 6, thrice a week as 5 once a week as 4 monthly as 2 rarely as 1 and never used as 0. The means scores on the maximum score of 7 and multiplied by 100.

Table 17: Percentage distribution of families based on food use frequency

Frequency	Cereals	Pulses	Leafy Vegetables	Roots and Tubers	Other Vegetables
Daily	100	2.0	-	2.0	
Thrice a Week	-	2.0	-	17.0	14.0
Twice a Week	-	71.0	-	46.0	83.0
Once a Week	-	23.0	-	33.0	2.0
Monthly	-	2.0	6	2.0	-
Rarely	-	-	94	-	1
Never	-	-	-	-	-
Total	100	100	100	100	100

Frequency	Nuts & Oil Seed	Fruits	Fish	Meat	Milk	Fats & Oils	Sugar	Tea / coffee
Daily	100	-	12	-	100	100	100	100
Thrice a Week	-	-	27	-	-	-	-	-
Twice a Week	-	2.0	46	-	-	-	-	-
Once a Week	-	2.0	15	2.0	-	-	-	-
Monthly	-	42.0	-	36.0	-	-	-	-
Rarely	-	54.0	-	62.0	-	-	-	-
Never	-	-	-	-	-	-	-	-
Total	100	100	100	100	100	100	100	100

N =100

Among the respondents surveyed, cereals, nuts and oil seeds, fats, sugar, milk, tea/coffee were taken daily and 71 per cent consumed pulses twice a week. Leafy vegetables were rarely consumed. Eighty three per cent consumed other vegetables twice a week. Both fish, roots and tubers were consumed twice a week. (46 per cent) each. Fruits and meat were rarely consumed.

Based on the frequency of use of different food items in the daily dietaries, food use frequency scores were calculated as suggested by Reaburn *et al.,(*1979). According to the scores obtained the frequency of food items were classified into three groups.

Table 18: Frequency of use of foods among the respondents.

Most frequently used (food score above 90)	Medium frequently used (food score between 50-90)	Less frequently used (food score below 50)
Cereals	Pulses	Fruits
Nuts and oil seeds	Roots and tubers	Meat
Sugar	Other vegetables	Leafy vegetables
Fats and oils	Fish	Beverages
Milk		
Tea/coffee		

As depicted in Table 18, cereals, nuts and oil seeds, sugar, milk, tea/coffee fats and oils were most frequently used food items. Pulses, roots and tubers, other vegetables and fish were medium frequently used while leafy vegetables, beverages, fruits and meat were less frequently used foods.

The per capita availability per person per day represents the average quantity of different foods available for each person in a family based on the food purchase inventory.

The details of food purchased for 1 month during the survey period were consolidated. From this the average availability and requirement of different foods per person per day was worked out considering the family composition of 100 families.

Table 19: Food availability per person per day

Food items	Mean Required qty(g)	Mean actual intake (g)	Adequacy	%of deficit
Cereals	480	377	-103	21.45
Pulses	52	47	-5	9.61
Vegetables	168	149	-19	11.03
Meat/fish/egg	45	39	-6	13.33
Oils and fats	37	30	-7	18.91
Sugar	43	35	-8	18.60
Fruits	51	22	-29	56.86
Milk	210	135	-75	35.71

The food availability and accessibility data was collected through food purchase inventory survey of one month duration, which revealed that majority of respondents were not purchasing or procuring enough food needed to meet their requirement based on the recommended allowance for a balanced diet as suggested by ICMR.

The personal habits of the respondents were also studied. It was observed that 20 per cent had the habit of alcohol consumption, 11 per cent practiced pan parag chewing. Twenty four per cent had the habit of smoking.

Fig- 3

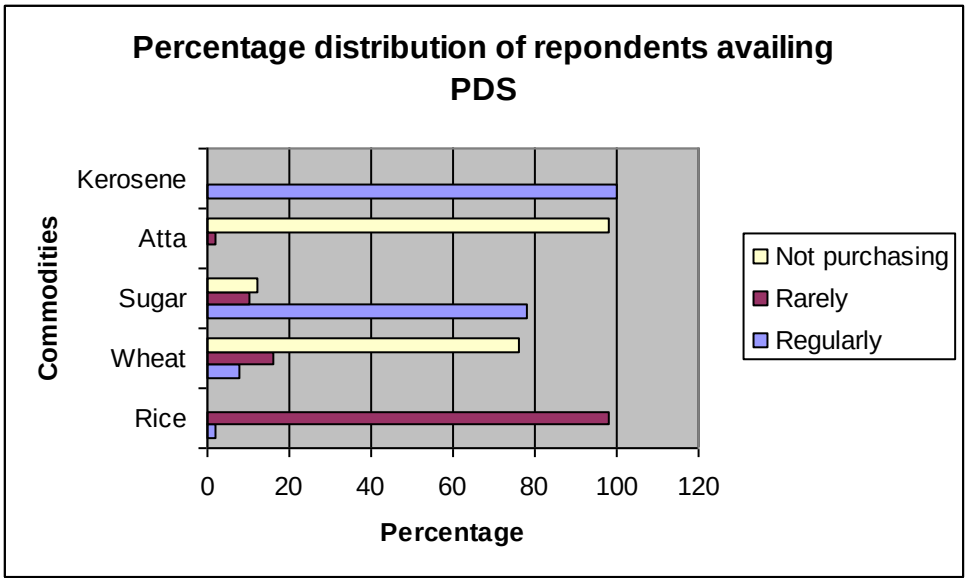

Percentage distribution of repondents availing PDS
Commodities
Kerosene
Atta
Sugar
Wheat
Rice
0
20
40
60
80
100
120
Percentage
Not purchasing
Rarely
Regularly

Table 20: Percentage distribution of respondents availing PDS .

Commodities	Regularly	Rarely	Nil
Rice	2	98	-
Wheat	8	16	76
Sugar	78	10	12
Atta	-	2	98
Kerosene	100	-	-

N =100

It was observed that, majority of the respondents bought kerosene from the PDS. Only a few availed of rice and wheat from PDS. Seventy eight per cent of the respondents bought sugar. Atta were rarely purchased. Fig 3 graphically represents the PDS utilization.

4.3. Food Security Index (FSI) of the respondents

Food Security Index (FSI) was determined based on food security indicators. Food security indicators mainly denote the coping mechanisms adopted by each respondent. Indicators based on Chung *et al*.,'s (1991), modified version of food security were adopted. The major indicators were broadly type of indebtedness, source of loans, coping with respect to food choices etc. The food security indicators were quantified by giving scores for always as 1, sometimes as 2 and never as 3. The information gathered has been tabulated and presented below.

Table 21: Percentage distribution of respondents based on food security indicators.

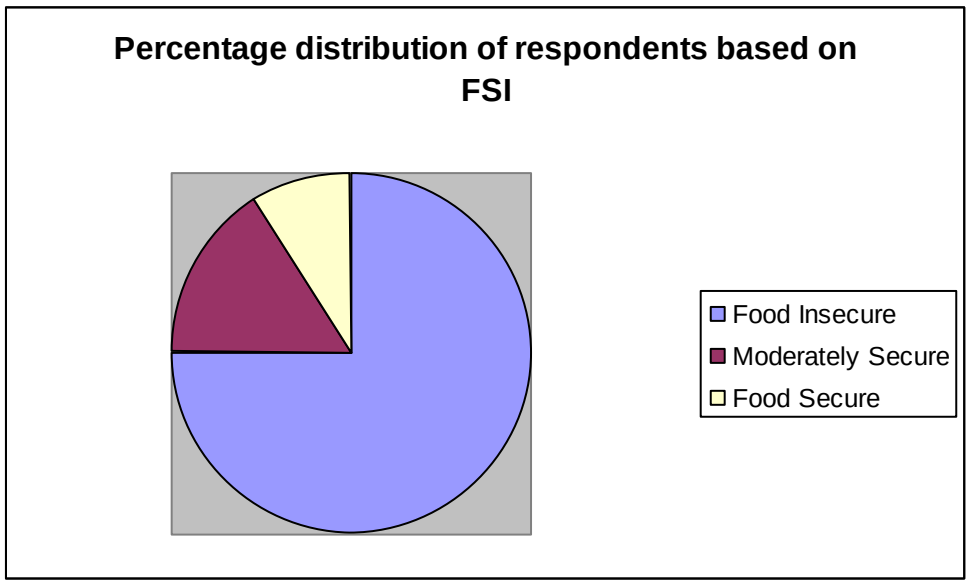
Indicators for food security	Always	Sometimes	Never	Total
Loss of livestock	46	24	30	100
Gold loan	-	23	77	100
Land loan	-	4	96	100
House loan	-	27	73	100

Borrowing from neighbors	-	28	72	100
Borrowing from relatives	-	4	96	100
Borrowing from money lenders	2	85	13	100
Daily wages	38	57	5	100
Chronic illness	1	36	63	100
Frequency of grain purchase	58	42	-	100
Substitution of inferior quality	-	98	2	100
Going without legumes	2	17	81	100
Going without fish/meat	-	4	96	100
Gruels for main food	6	94	-	100
Providing dowry	3	10	87	100
Ancestral debt	18	8	84	100
Amount spend on house construction	21	54	25	100
Education of children	4	12	84	100

Results of the analysis of the indicators are depicted in table 21. It was observed that the respondents depended on money lenders for availing loans and sold livestock for money.They had spent huge amount for house construction as well as providing dowry. They substituted gruel for main food. The source of their income was only daily wages.So majority of them could not spent money for education of children which forced the youngsters to be in the labour group from teenage period onwards. A considerable per cent(26%) households were holding ancestral debt too which was an additional burden to adopt coping mechanisms.

From FSI scores, the selected respondents were classified as food secure, moderately food secure and food insecure. The food insecure obtained a score below mean-S.D(75.33-3.59). The moderate food secure group obtained a score those between mean ± S.D . The food secure obtained a score those above mean + standard deviation(S.D) (75.33+3.59). It was found that 75 per cent belonged to food insecure group and 16 per cent moderately food secure group. It is discouraging to note that only

Fig- 4


Percentage distribution of respondents based on FSI
Food Insecure
Moderately Secure
Food Secure

9% belonged to the food secure group. Fig 4 diagrammatically shows the food security status of the respondents surveyed.

Table 22: Percentage distribution of respondents based on FSI

Food Security Index	Percent
Food Insecure <(75.33-3.59)	75
Moderately Secure(75.33±3.59)	16
Food Secure >(75.33+3.59)	9
TOTAL	100

4.4. Association of FSI with selected socio-economic variables.

Association of Food Security Index of the respondents with selected socio-economic variables like age, family type, educational qualification, monthly income, money expenditure on food, meals taken per day, skipping meals and utilization of PDS are shown below.

Table 23: Association of FSI with selected socio-economic variables.

No.	Socio-economic variables	Chi-Square values
1	Age	20.494**
2	Family type	0.405*
3	Educational qualification	13.123*
4	Monthly income	44.411**
5	Expenditure on Food	24.643**
6	Number of meals per day	1.935*
7	Skipping meals	1.886*
8	PDS utilization	10.714**

* significant at 5% level ** significant at 1%level

It was observed that there was significant association between FSI and all socio-economic variables such as age, family type, educational qualification, monthly income, expenditure on food, number of meals per day, skipping meals and PDS utilization.

4.5 The nutritional assessment of the micro sample.

In order to find out the extent of food utilization; the third component of the food security nutritional status was assessed on the micro sample of 30 women. Herein, anthropometry, biochemical Assessment, clinical examination and one-day weighment survey was undertaken and the results are as furnished below.

a) Clinical examination

The clinical examination of the micro sample was also assessed with the help of a physician who noted the signs and symptoms of disease conditions among the micro sample. The main health problems identified were anaemia, dental caries, night blindness.

Table 24: Percentage distribution of micro sample based on morbidity pattern.

Morbidity Pattern	Number	Percent
Oedema	1	3.3
Oral Health: Spongy Gums	4	13.3
Dental Caries	10	33.3
Night Blindness	10	33.3
Anaemia	30	100
Keratomalacia	2	6.7
Other Health Problems	5	16.7

It was found that total women were aneamic. 33.3 per cent each were suffering from night blindness and dental caries respectively. Five percent were suffering from other health problems like diabetes, wheezing and blood pressure.

b) Anthropometric measurements of the micro sample

In anthropometry, height, weight, waist and hip measurements was recorded. Body Mass Index(BMI) and Waist-Hip-Ratio(WHR) were determined from these measurements.

Table 25 denotes the percentage distribution of the micro sample based on BMI

Table 25: Percentage distribution of micro sample based on BMI

BMI CLASSIFICATION	NUMBER	PERCENTAGE
<18.50 Underweight	14	46
18.50-24.99 Normal	13	43.33
>=25 Overweight	3	10
TOTAL	30	100

Source: WHO 2004

It was observed that 46 per cent of the women were underweight. Forty three per cent were seen to be normal and 10 per cent were overweight.

The waist hip ratio was computed by taking the waist and hip measurements which is shown in Table 26.

Table 26: Percentage distribution of sample based on Waist-Hip-Ratio(WHR)

WHR	NUMBER	PERCENTAGE
<0.8(Low)	20	66.66
0.8(Normal)	9	30
>0.8(High)	1	3.3
TOTAL	30	100

Source: Srilakshmi, 2003

Among the micro sample surveyed, 66.66 per cent had low waist-hip-ratio, 30 per cent were observed to be normal in this aspect and 3.3 per cent had high waist-hip-ratio.

c) Biochemical Assessment

Haemoglobin level of the blood samples of the micro sample were studied. The analysis of the result is presented in table 27.

Table 27: Percentage distribution of micro sample based on haemoglobin level

HAEMOGLOBIN LEVEL (g/dl)	NUMBER	PERCENTAGE
<7.9(severe)	17	56.66
8.0-9.9 (moderate)	8	26.66
10.0 -10.9 (mild)	5	16.66
11-11.9 (marginal)	-	-
Total	30	100

Source: NIN, 1984

As the table explains, 26.66 per cent were moderately aneamic and 16.66 per cent were mildly aneamic. Fifty six per cent were severely aneamic. The result showed that all the women were found to have haemoglobin level below the normal range of 13-15 g/dl.

d) One day weighment survey.

One day weighment survey was done for assessing the actual food intake.The mean nutrient intake of the micro sample is given in Table 28.

Table 28: Mean nutrient intake of the micro sample.

Nutrients	Mean intake	RDA	%of RDA deficit
Energy(kcal)	1365.26	1875	27.1
Protein(g)	29.89	50	40.22
Fat(g)	17.32	20	13.3
Iron(mg)	12.35	30	58.8
Calcium(mg)	263.42	400	34.1

From the table, it is clearly seen that major as well as micro nutrients did not meet Recommended Dietary Allowances(RDA). A higher percentage of RDA deficit were noted in protein and iron intake.

Table 29: Analysis of variance of BMI with health and nutritional parameters.

Parameters	BMI	Mean	F value
Waist-Hip Ratio	< 18	0.80	1.645
	18 - 25	0.89	
	≥ 25	0.99	
Hb (g/dl)	< 18	12.07	2.966
	18 - 25	11.92	
	≥ 25	13.17	
Calories(kcal)	< 18	1201.63	12.096**
	18 - 25	1464.77	
	≥ 25	1757.92	
Proteins(g)	< 18	28.70	5.283*
	18 - 25	30.46	
	≥ 25	33.39	
Fat(g)	< 18	16.00	6.807*
	18 - 25	17.74	
	≥ 25	21.00	
Iron(mg)	< 18	12.07	2.921
	18 - 25	13.77	
	≥ 25	14.80	
Calcium(mg)	< 18	254.10	1.419
	18 - 25	266.43	
	≥ 25	272.48	

* significant at 5% level ** significant at 1%level

The ANOVA results revealed that calorie intake showed significant positive variation(12.096**) among the different classes of BMI at 1 per cent level. Similarly protein and fat intake showed significant positive variation with respect to BMI at 5 percent level.

4.6. Nutritional Status Index.(NSI) of the micro sample.

The Nutritional Status Index(NSI) was determined using the parameters BMI, WHR, and energy and protein intake.

The micro sample was classified into 3 groups according to NSI by evaluating mean and standard deviation. the selected micro sample were classified as those with above mean + standard deviation(S.D) as high nutrition status, those between mean ± S.D as moderate nutritional status and the respondents below mean-S.D with low nutrition status.

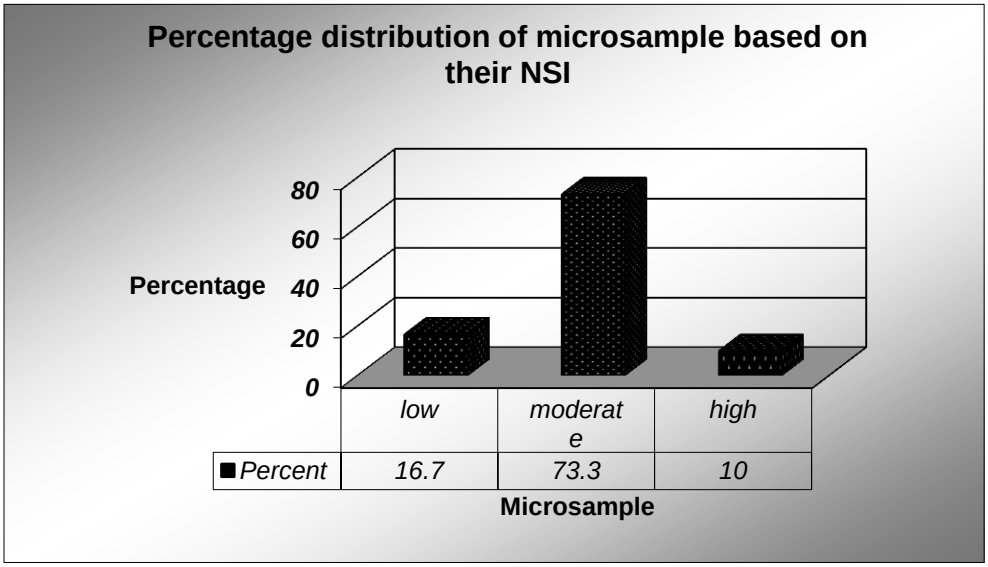
Table 30: Percentage distribution of micro sample based on their NSI

Nutritional Status Index	Number	Percent
Low <(545.04-151.75)	5	16.7
Moderate (545.04±151.75)	22	73.3
High >(545.04+151.75)	3	10
TOTAL	30	100

From the NSI, it was observed that 73.3 per cent were found to have moderate nutrition status, 16.7 per cent were low in nutrition status. Only ten per cent were observed to have high nutrition status which is depicted in Fig 5.

.

Fig- 5


Percentage distribution of microsample based on their NSI
Percentage
80
60
40
20
0
low
moderate
high
Percent
16.7
73.3
10
Microsample

4.7. Association between NSI and FSI in micro sample.

Chi-square test showed that there was a significant association between NSI and FSI at five per cent level.(6.127*). The figures in parenthesis indicate percentage

Table 31: Association between NSI and FSI in micro sample

Nutritional Status Index	Food Security Total Score (%)	
	Low	Moderate
Low	5	
	(35.70)	
Moderate	9	13
	(64.28)	(81.25)
High		3
		(18.75)

Chi square: 6.127; $p < 0.05$

Food Security Index has direct association with Nutrition Status Index. This implies that the food security of the family is ensured when the nutritional status of woman in the family is improved.

DISCUSSION

5. DISCUSSION

The results presented in previous chapter are discussed in this session with relevant empirical evidences and are presented under following heads.

5.1. Personal and socio-economic characteristics of the respondents.
5.2. Food consumption pattern of the respondents.
5.3. Food Security Index (FSI) of the respondents.
5.4. Association of FSI with selected socio-economic variables.
5.5. Assessment of nutritional status of the micro sample.
5.6. Nutritional status Index (NSI) of the micro sample.
5.7. Association between NSI and FSI on micro sample.

5.1. Personal and socio-economic characteristics of the respondents.

Rao (2001) viewed that people living in rural areas were not able to lead a life worthy due to poverty and their health conditions was the result of pernicious combinations of several socio-economic factors like unemployment, poor housing and sanitation ,malnutrition etc.

Ghosh (2000) observed that social factors like religion, occupation, economic status, education, beliefs and culture had important bearing on health.

Data on age of the respondents revealed that majority (45 per cent) belonged to the age range between 25 and 55 years. It is very encouraging to note that 31 per cent of the respondents were in the younger age group between 20 to 25 years of age. The availability of the younger age group in paddy cultivation has happened so because they followed the ancestral livelihood pattern and they had not adequate chances for education due to the poor economic status of their household. The findings of the study agrees with the earlier study reported by Shiny(2004) that youngsters belonging to farm families were engaged in farming as self employment. A considerable percentage of the respondents above the age of 55 years came under illiterate group.

Majority of the respondents belonged to SC/ST and backward classes and had a traditional background in paddy cultivation.. Majority of the respondents belonged to the Hindu religion and 23 per cent were Christians. This agrees with the findings of Kerala Statistical Institute (2000) that vast majority of the population of the Thiruvananthapuram district is predominated by Hindus, followed by Christians and Muslims. Results shows that the forward caste families were less engaged in paddy cultivation mainly due to the non-availability of man power. So they used to lease out their land. The present study also depicts that 90 per cent of the respondents were marginal farmers using leased in land for cultivation.

Majority of the families surveyed were nuclear (84 per cent). This data shows that the concept of nuclear family is becoming more and more common in our society and joint family system is fast disappearing. (Saxena, 2003). Among the 100 families, in 90 families there was only one employed member. More than one employed member belonged to joint family. Larsamma (2002) had found in her study that family income was directly proportional to the number of persons employed in the family.

On analysis of economic status of the selected respondents, it could be observed that almost 50 per cent had a monthly income within the range of Rs980-2935. The source of income was from daily wages. Only two per cent of the families had Rs8000 and above as monthly income from the agricultural produce.

Family income is considered as an important determinant of food security. Results of the study showed that 83 per cent of the families spent an amount ranging from Rs1000-2500 for food,69 per cent and 96 per cent spent Rs100-250 for clothing, Rs150-200 for housing respectively. Seventy three per cent spent Rs100-250 for travel expenses. It is surprising to find out that the majority of the respondents spent no money for entertainment, savings and education. But a major population spent huge amount for house construction which was the major cause of indebtness.It is the characteristic feature of most of the Keralites who spent a major portion of their earning to construct their homes. According to Jaya *et al*., (2000) family income also had a significant influence on

the health practices. Mehta and Singh (2004) reported that women with a low health status had an extremely poor level of income.

The major crops cultivated by the respondents were cereals and vegetables. Vegetables were cultivated during off-season. The area of cultivable land ranged from below 25 cents to within 1 acre. Ninety five per cent of the respondents were only cultivating paddy while 5 per cent were engaged in both paddy and vegetable cultivation. Paddy produced was used for household consumption by 18 per cent only. It was observed that with increase in production of paddy, consumption of paddy in household decrease because 90 per cent of the respondents cultivated on leased-in land. The respondents were forced to sell paddy which they receive as wages to meet their household expenditure. Vegetables produced during off-season were fully sold out for meeting the household expenses. Twenty five per cent of the respondents possessed cultivable land within 25 cents. They had a maximum production of 100kg paddy which seems to be 60 per cent deficit; the minimum production should be 250kg from 25 cents of land.

Dhillon and Kataria(2006) reported that due to low income and lack of knowledge they tend to sell their food crops at lower prices.

The other food crops that the respondents produced were pulses, roots and tubers and they had coconuts too. It is reported that two percent who had coconut trees were used to pledge the matured trees seldom to avail money .

By making frequent visit to the field the details about housing condition of the respondents were collected. Ghoyal and Prashant(2003) opined that the nutritional status of an individual is affected by living conditions. It was found that 98 per cent had their own homes and 2 per cent lived on rented building. Among the respondents who owned houses, 67 per cent had poor housing condition with inadequate facilities such as ventilation, storage cabinets, disposal of polluted water and so on.

Results of the study revealed that a minority (27 per cent) possessed livestock. Milk as well as egg were seldom used for home consumption, major part of these food

items were sold out for money. Twelve per cent of the respondents reported that they had no space for rearing goats and poultry birds.

UNICEF (2001) had reported that lack of ready access to water and poor environmental sanitation were important underlying causes of various types of infections resulting in malnutrition. As per findings of the present study majority of the respondents depended on water from public taps(58 per cent). In Kalliyoor panchayat, Padashekharam Samithis had provided municipality/ corporation water supply. Even though the drinking water facilities was made available, 42 per cent depended on water from well. They considered tap water inferior to well water. So they used well water for cooking purposes. Latrine/ sanitation facility was available for all the respondents. It was found that the wastes from households were disposed by putting them to fire. No soakage pit was found in any of the household. The respondents depended on nearest Primary Health Care Centres for physical ailments. Buying medicines from the shops constituted the major expense under health care.

According to Prema(1997) personal habits such as smoking and drinking alcohol was reported to have an influence on the occurrence of liver diseases. Results of the study showed that 20 per cent had followed the habit of consuming alcohol and 11 per cent had pan parag chewing. It is disheartening to note that pan parag chewing habit was present in the younger age group. Twenty four smokers were also present in the sample studied. It seems that they were quiet unaware of the consequences of these habits.

Correlations among the selected socio-economic variables age, family type, monthly income and expenditure for food were analyzed. The present study revealed that expenditure on food was positively and significantly associated with family type and monthly income. The findings of the study substantiate the report of Chakravarthy and Kuttykrishnan (2005) stating that the economic status directly or indirectly influences the purchasing power, standard of living, quality of life, family type and pattern of disease and deviant behaviour in the community. As monthly income increases the amount spent for foods also increases.

5.2. Food consumption pattern of the respondents.

According to Gift *et al*.,(2002) food habits of an individual are the characteristic repetitive act that he performs under the impetus of need to provide himself with nourishment and simultaneously to meet an assortment of social and emotional goals.

The findings of the study showed that 93 per cent respondents were non-vegetarians and 7 per cent were vegetarians. Consumption pattern of Keralites as reported by Kerala Statistical Institute (2000) also revealed that 98 per cent of the Keralites habituated to non-vegetarian foods.

Three meals a day namely breakfast, lunch and supper was found to be the common pattern of the families surveyed (84 per cent). Food consumption pattern revealed gross inadequacies as far as the women's diet were concerned. This agreed with the findings of the survey conducted by NNMB (2002) that rural families in our state are not in the habit of including all the food components specifically required for a balanced diet as well as uniform distribution of cooked food among the family members.. Niwani *et al.,*(2003) reported that in Baluchisthan even the rich are deficient in important nutrients due to their traditional food consumption pattern.

According to Poongodi et al.,(2003) factors like food preferences, availability of food items in the locality, knowledge of nutritional values of certain food items, relative prices of food articles were all found to determine priorities in food expenditure.

Cereals, tubers and fish were the major items in the meals. In the present study also rice was found to be the staple food in the diet. The result is in conformity with Shahbuddin (2003), Preet and Bhavana(2005) and Parvati and Babita(2002) who found that cereals especially rice continued to be the major staple food item among South Indians. Next comes the combination of cereals and tubers along with fish which was consumed by almost 50 per cent of the respondents. Pulses, Vegetables, milk and

beverages were medium frequently used. Fruits, meat and snacks were rarely consumed mainly due to lack of purchasing power and higher prices of food items. Beverages such as health drinks, soft drinks and fresh juices were seldom used especially by the younger generation. Behrman and Deolkar(2006) found that seasonal variations in environmental conditions, food availability, food prices and labour demands have considerable impact on nutrition.

Left over rice of lunch was consumed as gruel which was an important dinner item among the majority of families(86 per cent). Lina *et al.,(*2005) reported that a typical rural Kerala dietary pattern would be based on rice, fish, tapioca and coconut. The respondents reported that due to the higher price for fish the quantity purchased was less; so it could not form part of the dinner. The food use frequency score sheet was also included in the diet survey since the frequency of use of different food groups would give an indication to the adequacy of the family diet pattern as observed by Nelson *et al.*, (2003).

Nickles *et al.,(*2002) found that skipping meals were generally due to low income. In this study it was found that 16 per cent respondents had the habit of skipping meals. Breakfast and dinner were the meals skipped. But they used to have midmorning and evening tea from outside during working hours. The reason for skipping was due to the insufficient amount of cooked food available.

It was observed that vast majority of the respondents were not purchasing or procuring enough food needed to meet their food and nutrient requirement based on the recommended allowance for a balanced diet as suggested by ICMR. The main reason behind this was their poor economic status. Hence the energy and protein intake was deficit so that the subsistence ratio was low among the respondents.

Minority of the respondents avoided oily foods and commercially prepared food items. They avoided these food items for limiting their family budget. At the same time they were not aware of locally available nutritious foods such as papaya, custard

apple, rose apple, jamun and green leafy vegetables. Because of their faddism they were not utilizing these food items which were available at zero cost.

The utilization of Public Distribution System (PDS) by the respondents were studied and it was found 98 per cent did not purchase rice regularly. But they availed kerosene and sugar regularly from ration shop. According to Dreze(2001) PDS will reach the poorest subsistence farmer and at same time be a last resort price support for small/marginal farmers that will give him a minimum living standard.

5.3. Food Security Index (FSI) of the respondents.

To find out the Food Security Index (FSI), modified version of Chung *et al.*,(1991) was used. The main indicators observed in the results were family indebtedness, availing loans, substituting gruels for main food, selling livestock and spending less amount of money for education of children. A study conducted among rural households of Tamil Nadu by Silva et al., (2006) indicated that the farmers borrowed huge amount of money to invest in farming (agriculture). But it was not the same in Kerala. Here it was found that they spent the loan amount for other purposes.

Based on the FSI scores, it was found that16 per cent belonged to the moderately food secure group. Despite the coping mechanisms used by the respondents, 75 per cent comes under the food insecure group.

5.4. Association of FSI with selected socio-economic variables.

Association of FSI with selected socio-economic variables were studied. It was observed that there was significant association between FSI and socio-economic variables, such as age, monthly income and money expenditure on food. The respondents belonging to younger age group used to dine out, mostly lunch which costs Rs50 an additional expenditure on food.

5.5. Assessment of nutritional status of the micro sample

The nutritional assessment of the micro sample was studied by measuring anthropometry, biochemical assessments and clinical examinations. One day weighment survey of the micro sample was performed in order to find the nutrient intake.

Nutritional anthropometry is the measurement of human body at various ages and it is based on the concepts that an appropriate amount should reflect any morphological variation due to significant functional and physiological change.(Rao,2002)

Anthropometric measurements such as height, weight, and waist hip ratio (WHR) were taken into account for assessing the nutritional status of the micro sample.

Body Mass Index (BMI) is an indicator of body's energy stores as reported by Choudary and Solanki(2004). It was found from the study that among the micro sample, 43.33 per cent were normal. The prevalence of underweight was found to be 46.7 per cent and 10 per cent were overweight.

An increase in WHR indicates increased accumulation of abdominal fat. In this study, 66.66 per cent had low WHR.

Biochemical assessment of the micro sample were studied by testing the heamoglobin level in the blood sample. It was found 56.66 per cent were severely aneamic.

From the clinical examinations on micro sample it was found visual problems, oral health problems and other health problems such as diabetes, wheezing and blood pressure were prevalent in the group.

Gawarikar *et al*.,(2002) opined that the presence of iron deficiency aneamia was due to inadequate and unbalanced diet. All women were diagnosed as anaemic.

Other clinical symptoms found among them were dental caries and night blindness. Mild symptoms of spongy gums and keratomalacia were also diagnosed. Five per cent among them were detected with other health problems like wheezing, diabetes and blood pressure. The deficiency symptoms shown by the micro sample may be due to inadequate and unbalanced diet with low intake of fruits and vegetables which led to micronutrient deficiencies that may result in deficiency symptoms and poor work efficiency (Aggarwal *et al*., 2005)

Food consumption is another important determinant of nutritional status. An adequate or balanced diet provides all the essential nutrients in sufficient quantities and proper proportions to meet the needs of the body. (ICMR, 1989).

One day weighment survey was performed to calculate the actual food intake of the micro sample. In this study, all the nutrients were deficit of Recommended Dietary Allowances (RDA). Results of the study revealed that energy intake was 27.18 per cent deficit of RDA. The protein intake was 40.22 per cent deficit of RDA. Sunita and Singh(2002) conducted a study on SC adults in rural areas of Bihar and their food consumption pattern and found that their food and nutrient intake was lower than RDA which agrees with the findings of the present study.

A comparison of health and nutritional parameters with BMI was carried out using ANOVA and it was found that calorie, protein and fat intake had a significant variance between BMI.

5.6. Nutritional status Index (NSI) of the micro sample.

The Nutritional Status Index (NSI) of the micro sample was compared based on determining the nutritional status like height, weight, WHR, haemoglobin level, energy and protein intake. Nutritional status indices computed indicated that the majority of the sample (73.33 per cent) were those with moderate nutritional status, 16.7 per cent were low in their nutritional status.

5.7. Association between FSI and NSI on micro sample.

Chi-square values showed that there was significant association between NSI and FSI at 5 per cent level. Nathan *et al.,(*2008) reported in a study conducted in Orissa that FSI and NSI had significant association since nutritional status of an individual is an outcome of food security which substantiates the findings of the present study.

Summary

6. SUMMARY

The present study entitled" Food and nutrition security of paddy cultivators of Kalliyoor panchayat" was conducted with an objective to find the food and nutrition security of paddy cultivators in terms of food availability and utilization.

Locale of the study selected was Kalliyoor panchayat, an adopted village of College Of Agriculture. Marginal farmers who did viruppu, mundakan or punja during last five years were the respondents. Twenty five farmers each were selected randomly from the four existing "Padashekharam Samithis". Thirty women (micro sample) were also selected to investigate further on food utilization

An explorative survey technique with co-relational approach was used for the study.

Results of the study revealed that the respondents below the age group of 25 years were engaged in paddy cultivation. Majority of the respondents belonged to Hindu religion and 64 per cent belonged to SC/ST. Analysis of family structure revealed that 64 per cent of the respondents belonged to nuclear type of families. Majority of the families had their own homes with asbestos roof tops. Facilities of drinking water, sanitation and primary health care centers were available for the respondents.

Regarding educational status, it was found 30 per cent of them had education upto high school level. The occupational status showed that 90 per cent of them belonged to one earning member family. The income level of the respondents were below Rs8000 per month.

Dietary habits of the respondents indicated that all of them were habitual non-vegetarians. Among them cereals, sugars, nuts and oil seeds were frequently used. Roots

and tubers along with fish were their most preferred food combination. Fruits, meat and snacks were rarely consumed.

Minority of the respondents avoided oily foods and commercially prepared food items. At the same time they were not aware of locally available nutritious foods such as papaya, custard apple, rose apple, jamun and green leafy vegetables. Because of their faddism they were not utilizing these food items. 16 per cent had the habit of skipping meals. It was observed that 20 per cent had the habit of alcohol consumption and11 per cent practiced pan parag chewing. Twenty four per cent had the habit of smoking.

The major crops cultivated by the respondents were cereals and vegetables. Vegetables were cultivated during off-season. Ninety five per cent of the respondents were only cultivating paddy while 5 per cent were engaged in both paddy and vegetable cultivation. It was found that they had a maximum production of 100kg paddy which seems to be 60 per cent deficit in accordance with the cultivated area.

From the purchase inventory, it was observed that majority of respondents were not purchasing or procuring enough staple food needed to meet their requirement based on the ICMR recommended allowance.

Majority of the respondents availed only kerosene and sugar from PDS. Wheat and rice were rarely purchased from PDS. Available food resources were not utilized by the respondents because they needed a lump sum amount of money for the purchase of total food items supplied through ration shops. They used to get the food items in small quantities as well as on credit basis from the local provision stores.

Food Security Index was computed by giving scores to the food security indicators suggested by Chung *et al.,* (1991). It was found that 16 per cent

were moderately food secure and a vast majority (75 per cent) were food insecure and 9 percent belonged to food secure group.

The nutritional status of micro sample (30 women) was analyzed to find out food utilization. Classification of BMI revealed that almost fifty per cent were underweight and 43.33 per cent were normal. Majority of them had low Waist Hip Ratio (WHR) measurements. Only 30 per cent women belonged to the normal range.

Heamoglobin level of the respondents revealed that 56.66 per cent were severly aneamic and 26 per cent were moderately aneamic.

Assessment of clinical status of the micro sample revealed that majority had aneamia in different degrees followed by keratomalacia and night blindness. Spongy gums and dental caries were also diagnosed. Five per cent among the micro sample had other health problems like diabetes, wheezing and blood pressure.

Mean nutrient intake of the micro sample showed that their diet were deficit of RDA. Their diet lacked both macro and micro nutrients required for their well being.

Nutritional Status Index (NSI) was computed incorporating height, weight, WHR, haemoglobin level, calorie and protein intake. Among them 73.3 per cent had moderate nutritional status and 16.7 per cent were low in nutritional status.

A highly significant association was found between FSI and NSI and also FSI had high significant association with some selected socio-economic variables like age, family type, educational qualification, monthly income, expenditure on food, number of meals per day and PDS utilization.

From the findings it can be concluded that achievement of food security involves not only the availability of a range of foods essential for optimal nutrition

but also a substantial income level of the household for the access of these foods. In addition nutritional awareness and optimal use of locally available nutritious foods can be obtained through organizing education intervention programmes especially for women in order to follow desirable nutrition related practices for the achievement of better food utilization.

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Appendices

APPENDIX-1

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI
DEPARTMENT OF HOME SCIENCE

FOOD AND NUTRITION SECURITY OF PADDY CULTIVATORS OF KALLIYOOR PANCHAYAT

SCHEDULE TO ELICIT INFORMATION ON SOCIO-ECONOMIC AND PERSONAL CHARACTERISTICS OF RESPONDENTS

1. Name and address:
2. Age: Sex: M/F
3. Caste: Forward/ OBC/ SC/ST
4. Family size: a) 1-2 b) 3-4 c) 5-6 d) 7-8
5. Family type: Nuclear/ Joint
6. Family composition

Sl:no	SEX	AGE	RELATIONSHIP WITH RESPONDENT	EDUCATION	OCCUPATION	INCOME

7. Land possessed cents/ acre/ nil
   a) Area of cultivated land
   b) Crops cultivated in your land:

   c) Details of livestock possessed
      No:of animals : cow/ buffalo/ goat/ pig
      No:of birds : hen/ duck
   d) Farm equipments available
      i)Tractor ii) Power tiller iii) Power sprayer iv) Rocker
      v) Harvester vi) Thresher vii) Tarpolin viii)Oil engine
      ix) Knapsack sprayer

8. Monthly expenditure of the family

ITEMS	AMOUNT SPENT
FOOD	
CLOTHING	
HOUSING	
TRAVELLING	
EDUCATION	
ENTERTAINMENT	
HEALTH CARE	
SAVINGS	
MISCELLANEOUS	

9. Type of house : own/ rented/ others.
10. Housing condition : Thatched/ tiled/ combined/ asbestos/ concrete
11. Source of drinking water : pipe/ river/ well water/ tube well
12. Availability of latrines, drainages : YES/ NO

If yes, sanitary latrine/ pit type/ soak pit/ open area.

APPENDIX- 2

KERALA AGRICULTURAL UNIVERSITY
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DEPARTMENT OF HOME SCIENCE

DIET SURVEY SCHEDULE TO ELICIT INFORMATION ON NUTRITION SECURITY OF RESPONDENTS

1. Specify : Vegetarian/ Non- vegetarian/ others
2. Food use frequency of the family

Items	Daily	Thrice in a week	Twice in a week	Once in a week	Monthly	Rarely
CEREALS						
Rice						
Rice flakes						
Puffed rice						
Wheat						
Maida						
Atta						
Suji						
Vermicelli						
Ragi						
PULSES						
Red gram						
Bengal gram						
Green gram						
Black gram						
Cow pea						
Green peas						
Soya bean						
Horse gram						
LEAFY VEG						
Amaranthus- red						
Amaranthus- green						
Colocasia leaves						
Curry leaves						
Drumstick leaves						
Agathi leaves						
Chekkurmanis						
Cabbage						

Items	Daily	Thrice in A week	Twice in a week	Twice in a week	Monthly	Rarely
ROOTS&TUBERS Beetroot Carrot Colocasia Onion small Onion big Sweet potato Potato Tapioca Yam Any other , specify OTHER VEG Ashgourd Bittergourd Beans Cauliflower Cucumber Drumstick Jack,tender Ladies finger Mango green Papaya Plantain Pumpkin Snake gourd NUTS & OIL SEEDS Coconut Cashewnut Groundnut Gingelly seeds Mustard seeds Any other, specify						

Items	Daily	Thrice in a week	Twice in a week	Once in a week	Monthly	Rarely
MEAT & POULTRY Beef Chicken Duck Liver Egg,duck Egg,hen Mutton MILK & MILK PRODUCTS Milk, buffalo Milk,cow Milk,goat Curd Buttermilk Skimmed milk powder FATS & OILS Coconut oil Palm oil Gingelly oil Ghee/ butter SUGAR Sugar Molasses Honey Jaggery MAIN DISHES Idli Dosai Chapathi Puri Appam Puttu Uppuma Parotta Biriyani Plain rice						

Items	Daily	Thrice in a week	Twice in a week	Once in a week	Monthly	Rarely
SNACKS Baked products Fried products Sweets Ice creams BEVERAGES Health drinks Soft drinks Aerated drinks Stimulating drinks Fresh juice Coconut water						

3. How many times meals are taken in a day
   a) once b) twice c) thrice d) more than thrice

4. Does anyone in the family skip meals? YES/ NO If yes, who
   If yes, which meal : breakfast/ lunch/ dinner

5. Do anyone consume left over foods: YES/ NO If yes, who
   If yes, details

6. Food consumed for each meal last day

MEAL	MENU	QUANTITY
Early morning Breakfast Midmorning Lunch Midafternoon Tea-time Dinner		

7. Do you avoid / omit any foods? YES/ NO

FOODS AVOIDED	REASONS

8. Do anyone in the family have any of the following habits?

HABITS	YES/ NO	HOW OFTEN
Pan parag chewing Frequent drinking of a) Tea b) Coffee c) Any other Smoking Drinking alcohol		

9. Details of quantity of food crops and livestock produced, purchased, sold and consumed during last year

ITEMS	PRODUCTION	PURCHASED	SOLD	CONSUMED
Rice				
Tapioca				
Yam				
Beans				
Ash gourd				
Bitter gourd				
Spinach				
Banana				
Coconut				
Rubber				
Milk				
Egg				
Any other,				

10. Availing PDS facility

FOOD MATERIALS	REGULARLY	RARELY
Rice		
Whole wheat		
Sugar		
Atta		
Kerosene		
Others specify,		

11. Indicators to measure Food Security YES/ NO

a) owning poor quality land
b) holding distress sale of large livestock or small livestock
c) pledging valued assets such as jewellery
d) pledging sale of land
e) pledging sale of house
f) taking small loans from neighbour
g) taking small loans from relatives
h) taking small loans from money lenders
i) relying heavily on wage work
j) suffering from chronic illness

k) purchasing staple grain more than once in a week
l) substituting inferior quality staple food for preferred quality
m) going without legumes/ fish
n) substituting gruels for main staple food
o) providing dowries
p) repayment of ancestral debt
q) repayment of consumption loan
r) huge amount spent on house construction
s) education of children
t) migration in search of work

APPENDIX- 3

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI
DEPARTMENT OF HOME SCIENCE

SCHEDULE TO ELICIT NUTRITIONAL ASSESSMENT OF MICROSAMPLE

1. Name and address:
2. Age
3. Type of family: Nuclear/ Joint
4. Educational level: (a) illiterate (b)primary school (c)high school (d)SSLC (e)pre-degree (f)degree

5.Occupation
6. Monthly income of the family.

7.ANTHROPOMETRIC MEASUREMENTS
(a)Height(cm)
(b)Weight(kg)
(c)Waist measurement
(d)Hip measurement
(e)Haemoglobin level

8. Do you remember the date of your last hospital visit?
(a)current month (b)last month (c)two months back.

9. CLINICAL SYMPTOMS
(a)Hair : Sparse
Discoloured
Easily plucked
(b)Moon face
(c)Parotid enlargement
(d)Oedema
(e)Pigmentation at : Knuckles
Fingers
Toes
(f)Gums : Spongy
Bleeding
(g)Keratomalacia
(h)Night blindness
(i)Enlargement of thyroid
(j)Anaemia
(k)Dental caries
(l)Other health problem

APPENDIX-4

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI
DEPARTMENT OF HOME SCIENCE

SCHEDULE TO ASSESS INDIVIDUAL DIETARY CONSUMPTION OF THE MICROSAMPLE

1. Specify: Vegetarians/ Non-vegetarians/ Others
2. Do you skip meals: Yes/ No
   If Yes, which meal
   (a)Breakfast
   (b)Lunch
   (c)Dinner

3.Total nutrient intake

Type of food preparations	Ingredients	Raw quantity of each ingredients	Total cooked amount	Quantity of intake

Calculation of total nutrient intake

$$\text{Individual intake in terms of raw equivalent(g)} = \frac{\text{Total raw amount for each ingredient} \times \text{Individual intake of cooked amount(g)}}{\text{Total cooked amount (g)}}$$

FOOD AND NUTRITION SECURITY OF PADDY CULTIVATORS OF KALLIYOOR PANCHAYAT

NAZIYA LATHEEF

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Abstract of the

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Abstract

ABSTRACT

FOOD AND NUTRITION SECURITY OF PADDY CULTIVATORS OF KALLIYOOR PANCHAYAT.

The present study was carried out at Kalliyoor Panchayat, an adopted village of College of Agriculture, Vellayani. Hundred paddy cultivators from the selected four "Padashekharam Samitis" drawn at random were the main sample. From the hundred families, thirty women were selected as the micro sample and their nutritional status were assessed since the women are the key indicators of food adequacy at household level.

The study focused on the importance of food security among the paddy cultivators and thereby assuring nutrition security among them. Findings revealed that the paddy cultivators, though the producers of food grains were not enjoying food security.

The objective of the study is to assess the household food and nutrition security of selected paddy cultivators in terms of food availability and its utilization. The outcome of food security can be taken to be the nutritional status of the individuals, with the understanding that food intake is the basic factor and a number of non food factors such as sanitation, access to clean drinking water, access to health care facilities also determine food and nutrition security.

Tools were constructed to ascertain the socio-economic status and personal characteristics of the respondents. Monthly expenditure on different food items were observed by purchase inventory. Food frequency, food consumption pattern and food habits of the family were studied with the help of diet survey.

For the micro sample, anthropometric measurements, biochemical estimation, clinical assessment, one-day weighment survey were executed.

All the respondents in the study reported the use of leased in land for cultivation. It was found that tapioca, rice and fish were most commonly consumed foods. Majority of the

respondents substituted gruels instead of rice. The consumption of fruits was very low or rare. Majority of the respondents belonged to SC/ST groups and they took small loans from money lenders.

The food availability and accessibility data is collected through food purchase inventory survey of one month duration, which revealed that majority of respondents were not purchasing or procuring enough food needed to meet their requirement based on the recommended allowance for a balanced diet as suggested by ICMR.

As far as the micro sample is considered, it was found that their diet did not meet the RDA. Their diet lacked macro as well as micro nutrients.

The results of the study reveals that based on the food security indicators (modified version of Chung *et.al*), only 9% were food secure, 16% moderately food secure and 75% food insecure.

The data collected from micro sample denoted that only 10% women were food secure, 73% moderately food secure and 17% food insecure.

Therefore it can be concluded that majority of the respondents falls in the food insecure group indicating a considerable percentage execute inappropriate coping mechanisms to be food secure with the available resources.